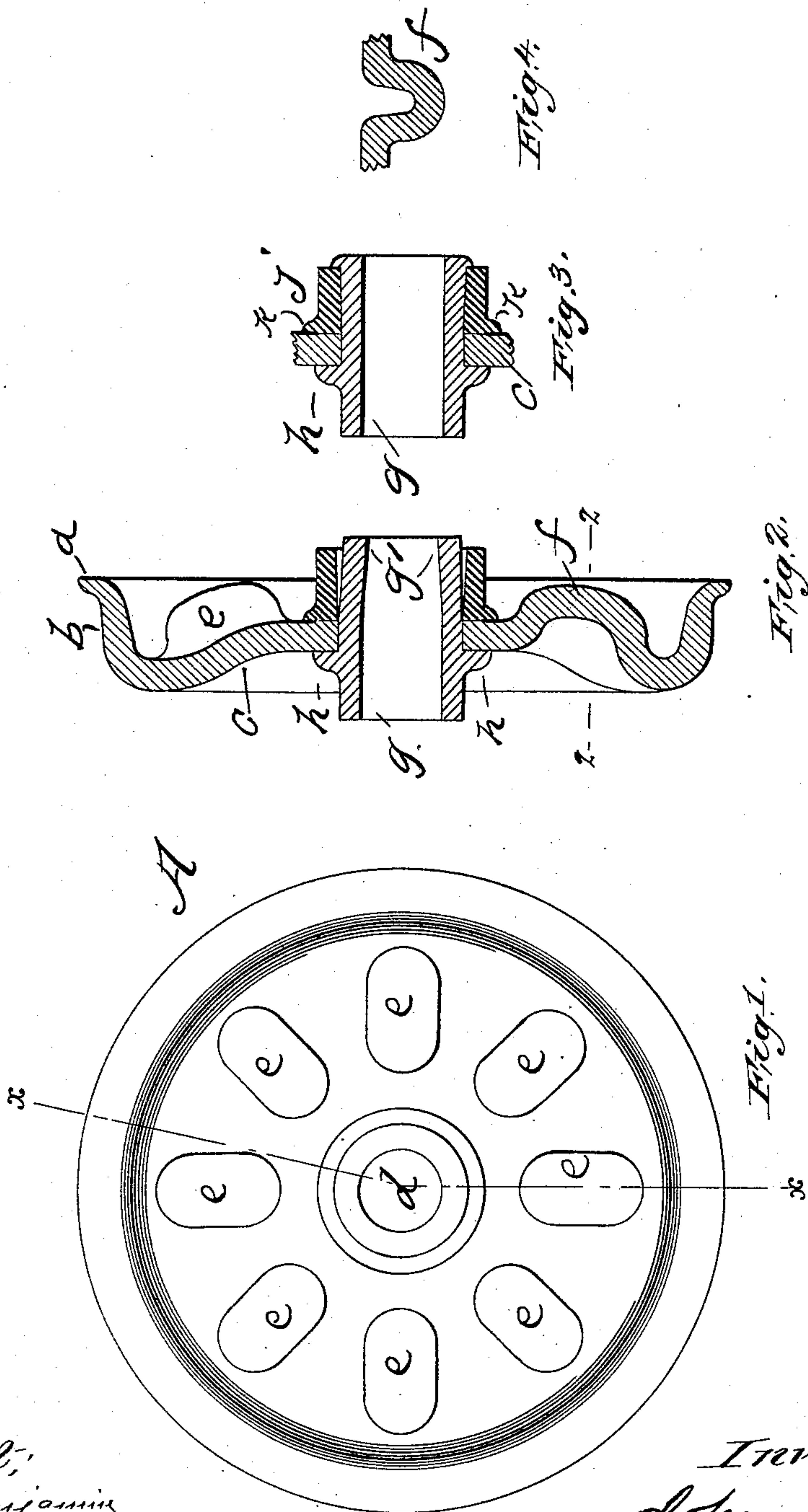


(No Model.)

J. GRAVES.  
WHEEL.

No. 539,895.

Patented May 28, 1895.



Attest:  
C. W. Benjamin  
P. A. Fay

Inventor:  
John Graves  
by Walter Brown  
att'y



# UNITED STATES PATENT OFFICE.

JOHN GRAVES, OF BROOKLYN, NEW YORK, ASSIGNOR TO HIMSELF AND  
LOUIS MONJO, OF SAME PLACE.

## WHEEL.

SPECIFICATION forming part of Letters Patent No. 539,895, dated May 28, 1895.

Application filed March 16, 1894. Serial No. 503,964. (No model.)

*To all whom it may concern:*

Be it known that I, JOHN GRAVES, a citizen of the United States, and a resident of Brooklyn, in the county of Kings, State of New York, have invented a certain new and useful Improvement in Wheels, of which the following is a specification.

My invention relates to improvements in wheels.

Especially the invention relates to wheels which are formed of sheet metal, and to the methods of making such. Said sheet metal wheels are especially adapted to use with sugar wagons, tram cars, and many other kinds of vehicles, on account of the combined lightness and strength of sheet metal wheels, and their cheapness as compared with cast iron wheels.

Not only is my process of pressing wheels in dies a cheaper operation than that of casting, but it also saves the cost of tires of harder metal, or the cost of chilling the periphery of the cast wheel to fit it for a tire; and, whereas, cast wheels are liable to be cracked by any blow or shock, the sheet metal wheels are tough and will not break under blows or shocks. The sheet metal wheels are also much lighter and can be, therefore, packed and shipped much cheaper and easier than the cast wheels.

Referring to the drawings which accompany the specification to aid the description, Figure 1 is a face view of a completed wheel. Fig. 2 is a section of the same on the line  $x x$  of Fig. 1, but showing the hub only partly completed. Fig. 3 is a broken sectional detail showing a finished hub. Fig. 4 is a broken section of the web of the wheel on the line 2 2 of Fig. 2.

The wheels are formed by the following method: A plate of sheet steel of proper thickness is pressed between dies and dished and shaped to the form shown in the section, Fig. 2—that is to say, by the pressure of suitable dies I form a wheel that is provided with the flange  $a$ , thread  $b$ , web  $c$ , all in one integral piece of sheet metal. After pressing to shape a hole  $d$  is cut out of the center, to be fitted with a hub, as hereinafter described.

In the case of small wheels the curving and dishing of the sheet metal will of themselves give the necessary stiffness, but in the case of

large wheels I prefer to further stiffen them by ribs or corrugations, shown at  $e$  in elevation and  $f$  in section, Fig. 2. Said ribs or corrugations  $e, f$  are formed by corresponding surfaces on the dies at the same time that the general body of the wheel is shaped. In Fig. 1 I indicate eight of such ribs or corrugations.

To form the hub a tube  $g$ , provided with a circumferential shoulder  $h$ , is fitted in the hole  $d$ . Said tube  $g$  has the part that will project beyond the web  $c$  opposite to the flange  $h$ , preferably somewhat coned, as shown at  $g'$ , so that when the hub is complete the bore of said tube  $g$  will be truly cylindrical. A sleeve  $j$  provided with a circumferential flange  $k$  is fitted snugly on the part of the tube  $g$  which projects beyond the web of the wheel, (Fig. 2) and the end of said tube  $g$  is upset over the end of the sleeve  $j$ , (Fig. 3) thereby holding both tube and sleeve tightly in place, and forming a strong hub.

Now, having described my improvements, I claim as my invention—

1. A wheel formed of a sheet metal web, flange and tread all in one integral sheet of metal, corrugations in the web substantially radial to the center of the wheel, and a hub consisting of an inner and an outer tube, whereof the inner tube flanges against one side of the web, and upsets over the outer tube at the opposite end, substantially as described.

2. A wheel formed of a sheet metal web, flange and tread in one integral sheet of metal, corrugations  $e$  in said web arranged substantially radially to said wheel, and a hub formed of an inner tube which passes through an eye in the web and flanged against one side of said web and of an outer tube which flanges against the other side of said web and is held by the upset end of the inner tube, substantially as described.

In testimony that I claim the foregoing as my invention I have signed my name, in presence of two witnesses, this 14th day of February, 1894.

JOHN GRAVES.

Witnesses:

PATRICK A. FAY,  
DAVID WALTER BROWN.