July 12, 1927. 1,635,490

A. MELDRUM

CAST METAL VEHICLE WHEEL

Filed May 21, 1925 2 Sheets-Sheet 1

FIG. 4.

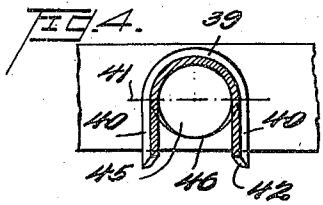


FIG. 3.

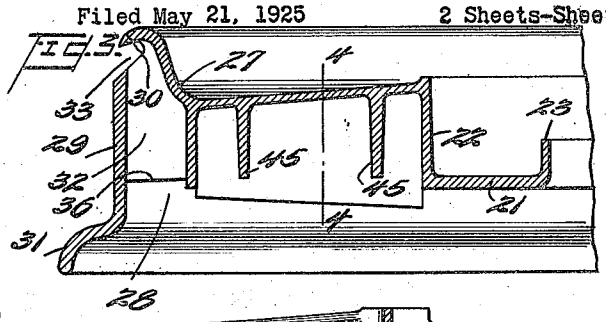
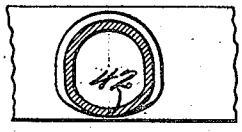


FIG. 5.



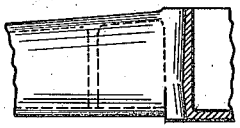


FIG. 6.

FIG. 1.

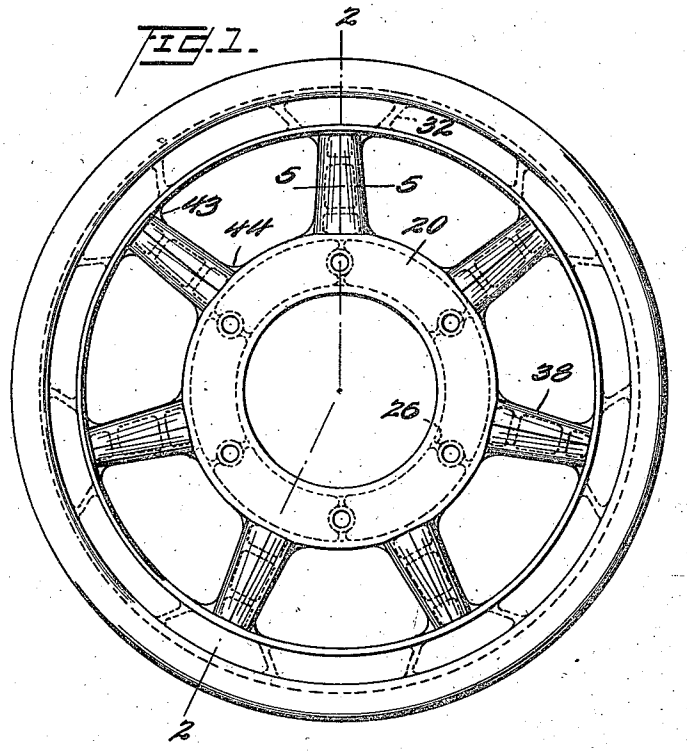
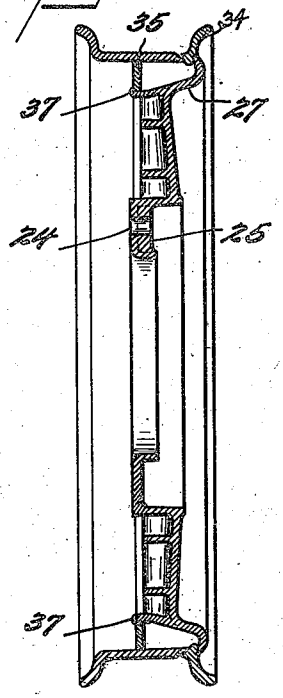


FIG. 2.



Witnesses
David A Nilsson

Alexander Meldrum INVENTOR.

BY

Watson, Coit, Morse & Grindle,
ATTORNEY.

July 12, 1927. 1,635,490

A. MELDRUM

CAST METAL VEHICLE WHEEL

Filed May 21, 1925 2 Sheets-Sheet 2

FIG. 8.

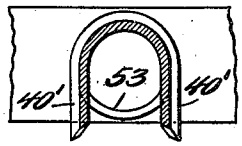


FIG. 10.

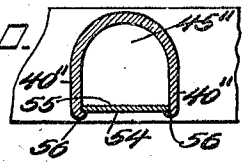


FIG. 7.

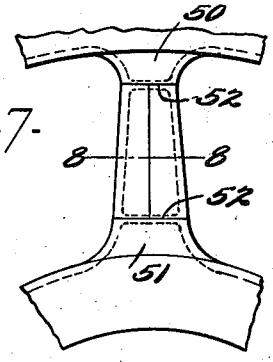
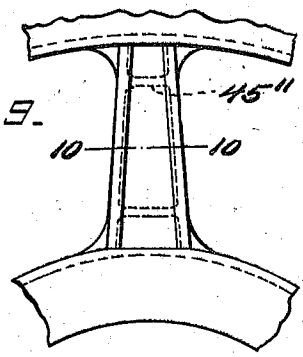


FIG. 9.



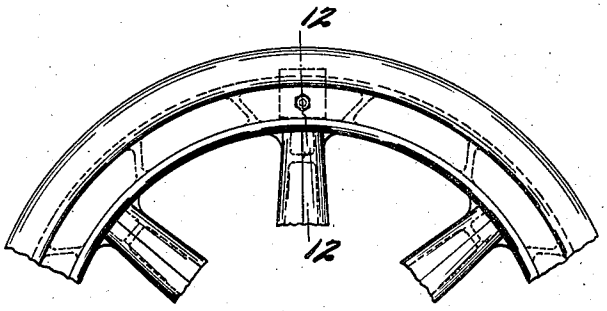


FIG. 11.

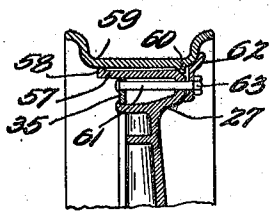


FIG. 12.

Witnesses
David A. Nilsson

Alexander Meldrum INVENTOR.

BY

Watson, Coit, Morse & Grindle,
ATTORNEY.

Patented July 12, 1927. 1,635,490

UNITED STATES PATENT OFFICE.

ALEXANDER MELDRUM, OF SYRACUSE, NEW YORK.

CAST-METAL VEHICLE WHEEL.

Application filed May 21, 1925. Serial No. 31,699.

This invention relates to vehicle wheels, and more particularly to cast metal vehicle wheels.

It is a general object of the present invention to provide a novel and improved type of cast metal vehicle wheel.

More particularly it is an object of the present invention to provide a cast metal vehicle wheel in which the hub, spokes and felloe are cast integral without the use of cores and yet a tubular spoke provided.

Another object of the present invention consists in the method of making a cast metal vehicle wheel without the use of cores by casting the spokes in channel form and closing them to tubular shape by suitable forming devices.

A further object of the present invention consists in the provision of a one-piece cast metal vehicle wheel which is cast with channel-shaped spokes connecting the felloe and hub, which channels are sufficiently sheared from the attached parts to enable them to be pressed into tubular shape.

A further object of the present invention consists in the provision of a metal vehicle wheel, cast with all of its load supporting portions integral and having spokes, which in their finished form comprise closed tubular members provided with integral transverse reinforcing webs.

Other and further objects of the present invention will be more apparent as the description proceeds.

For a full understanding of the present invention reference should be had to the accompanying drawings and following specification wherein are disclosed several illustrative embodiments of the present invention with the understanding, however, that various changes may be made therein by those skilled in the art without departing from the spirit of the invention or the scope of the attached claims.

In said drawings:

Fig. 1 is a face view of a completed wheel constructed according to the present invention, certain parts being shown in dotted lines;

Fig. 2 is a section of the same on line 2—2 of Fig. 1;

Fig. 3 is a partial section on line 2—2 of Fig. 1 on an enlarged scale, but showing a spoke in its original cast shape;

Fig. 4 is a section on line 4—4 of Fig. 3;

Fig. 5 is a section on line 5—5 of Fig. 1, showing the spoke in its completed shape;

Fig. 6 is a view similar to Fig. 3 but showing one of the spokes in elevation and in its final form;

Fig. 7 is a partial side elevation of a modified form of spoke construction;

Fig. 8 is a section on line 8—8 of Fig. 7 but showing the spoke in its incomplete form;

Fig. 9 is a side elevation of a portion of a wheel showing a further modified form of spoke construction;

Fig. 10 is a section on line 10—10 of Fig. 9, showing the spoke in completed form;

Fig. 11 is a partial face view; and

Fig. 12 is a section on line 12—12 of Fig. 11 showing the wheel of Fig. 1 modified to receive a demountable rim.

In the manufacture of metal vehicle wheels the most desirable feature, consistent with good quality, is the reduction of labor costs and in making cast metal wheels it has been found that the elimination of cores materially reduces the amount of labor necessary for molding and casting the wheels and at the same time eliminates the possibility of defective castings due to floating cores and similar difficulties. It is therefore contemplated, according to the present invention, to cast a vehicle wheel having integral hub, spokes, felloe and rim in which the spokes are cast as open sided channels, attached at their ends to the hub and felloe, the sides of the channels being vertical and flat so that the pattern can be drawn from the flask. The wheel is preferably cast from malleable iron and after the annealing process the flat sides of the channels are bent and their edges brought together to form complete tubular spokes, the meeting edges of the sides of the channels being brazed or similarly secured together, as are the ends thereof to the hub and felloe.

Referring to the drawings, Figs. 1 to 6 disclose the preferred embodiment of the invention, and it will be noted that the wheel comprises a hub member 20 composed of the flat radial annulus 21 and the cylindrical outer portion 22. If desired, a flange or ring 23 may be turned inward as shown to assist in supporting the wheel from a suitable inner hub or bearing carrying mem-

ber to which the wheel may be fastened by suitable devices passing through the openings 24 which are reinforced by the bosses 25 and the webs 26. A felloe portion 27 is provided which is curved in cross section as clearly shown in Figs. 2 and 3, and is open on the other side as at 28. This felloe 27 is initially formed integral with the rim 29 by being secured to it at the edge 30. The rim 29 is provided on the side opposite the edge 30 with a suitable tire retaining flange 31 as is common practice. The rim is further and permanently secured to and supported from the felloe by means of the non-radial webs 32, shown in dotted lines in Fig. 1, two being provided adjacent the end of each spoke and directed in opposite directions therefrom toward the rim, thus completely supporting the rim from the felloe in spite of the groove 33 which is later turned in the base of the rim to receive the well known locking or side ring 34, as shown in Fig. 2, which serves to retain the tire in position and can be released as is well known for mounting and demounting tires.

The non-radial webs connecting the felloe and rim are not claimed in this application, but are more fully disclosed, described and claimed in my Patent No. 1,610,024, December 7, 1926, for sectional wheels.

The open space 28 between the edge of the felloe and the rim may be closed for the sake of appearance and to give additional strength to the wheel by means of ring 35 which can be pressed into position to rest on the edges 36 of the webs 32 and securely fastened by staking over the edge of the felloe as shown at 37.

The hub and felloe are secured together by any suitable number of spokes 38, preferably seven in number as shown, which are cast integral with these two parts. In order that the pattern may be drawn from the sand these spokes are cast as the open sided channels of which the bottom 39 are substantially semicircular in cross section, and the flat sides 40 of which lie in planes at right angles to the median plane or plane normal to the axis of the wheel. If preferred the spokes may taper in width from the hub toward the felloe as clearly shown in Fig. 1. Fig. 4 is a cross section of the spoke as cast. It will be seen that the ends of the flat sides 40 are secured to the surfaces of the felloe and hub portion 22 from which they must be severed, preferably by shearing to the line 41 in Fig. 4 in order that they may be bent into the shape shown in Fig. 5 with their edges 42 meeting to form a complete closed tubular spoke of any desired cross section either circular, elliptical or any other suitable form. Where the spokes meet the felloe and hub suitable fillets 43 and 44 are provided and portions of these fillets may be sheared with the sides 40 if desired to form a finish where these sides meet the hub and felloe when the spoke is bent into tubular form, although the fillets may be omitted where these flat sides meet the hub and felloe in the initial casting to simplify the shearing operation.

It is desirable in order to eliminate any openings or cracks from the finished wheel to suitably secure together the edges 42 and the ends of the sides 40 where they have been sheared from the hub and felloe to these parts after the bending. This may be done by brazing with spelter or like material or by welding.

The wheels are cast from malleable iron so that the sides 40 can readily be bent, after the annealing process, by placing the spokes in suitable saddles and pressing the edges 40 together with a former which may have an internal shape to conform to that of the desired finished outline of the spokes. It is desirable that the spokes be provided with reinforcements to increase their strength and to prevent their deforming under load by changing their outline. Such reinforcement serves to maintain the curved portions 39 of the spokes against flattening which may happen if the spoke has force applied to it tending to bend it in the direction of its length. This reinforcement can best be effected by casting the webs 45 transversely of the spokes and integral with the curved bottom portions 39 as clearly shown in Figs. 3 and 4. These webs may, if desired, be given such a configuration on their free edges 46 as to act as formers around which the flat sides 40 may be bent to thus determine the exact outline of the side of the spoke formed by these two parts. This, however, is not necessary and the webs may only be of semicircular or similar shape instead of complete disks separating the finished spokes into three compartments as shown in Figs. 1, 2 and 6.

The completed spokes have the outline of their cross section wholly inside of the edges of the hub. It will be further noticed that the felloe of this wheel extends mostly to one side of the center, leaving clearance on the other side clear to the inside surface of the rim so that large brake drums may be used with this form of wheel and adequate clearance provided for brake mechanisms and brake operating devices, which is of particular importance in connection with four-wheel brakes and the use of balloon tires which under ordinary conditions restrict the size of the brake drum owing to the smallness of the wheel.

In Figs. 7 and 8 is shown a modified form of spoke in which the ends 50 and 51, which join the felloe and hub, are cast in their tubular shape by providing cores projecting toward the spoke from the hub and felloe, a disk or former 52 covering the end of each

tubular portion 50 and 51 and having a projection or shoulder 53 about which the flat sides 40′ may be bent to form the complete tubular spoke these disks 52 serving as reinforcing members in the same manner as the webs 45 and likewise acting as formers to determine the outline of the completed spoke. The meeting edges of the sides 40′ may be brazed together and the ends brazed to the parts 50 and 51.

In Figs. 9 and 10 is disclosed a further modification of spoke construction in which the sides 40″ are shorter than in the construction disclosed in Figs. 1 to 6 and are not bent over to close the spoke, a closing member or strip 54 being used for this purpose which is placed in position resting upon the outer edge 55 of the webs 45″ and held in position by staking over the edges 56 of the sides 40″ as best shown in Fig. 10. This closing strip need not be flat, as shown in the figure, but can be formed to any desired configuration to assist in the appearance of the completed wheel. The ends can be welded to the hub and felloe as described in connection with the preferred modification.

Figs. 11 and 12 disclose the wheel of Figs. 1 and 2 formed for the reception of a demountable rim which is sometimes desired. In this case the felloe 27 has formed integral with it a portion 57 similar to the rim 29 but narrower, and having the circumferential flange 58. Over this can be placed the demountable rim 59 having the inturned flange 60 abutting against the edge of the felloe and thus limiting the movement of the rim over the felloe while the flange 58 supports the opposite edge of the rim. Bolts 61 may be passed through the closing ring 35 of the edge of the felloe 27 to secure the lugs 62 in position, which lugs serve to maintain the rim in position and are themselves held on by the nuts 63 secured on the bolts 61. Otherwise, the construction is identical with that disclosed in Figs. 1 to 6.

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

1. A cast metal vehicle wheel, including in combination, an integral hub, spokes and felloe, said spokes being cast as open sided channels connecting the hub and felloe, transverse webs integral with said channels and means for closing the open sides of said channels.

2. A cast metal vehicle wheel, including in combination, an integral hub, spokes and felloe, said spokes being cast as open sided channels connecting the hub and felloe, transverse webs integral with said channels and means closing the open sides of said channels and conforming to the edges of said webs.

3. A metal vehicle wheel including in combination, a hub, felloe and spokes cast integral, said spokes being cast as open sided channels, integral transverse webs in said channels having former edges, the sides of said channels being bent over against said former edges.

4. A metal vehicle wheel including in combination, a hub, felloe and spokes cast integral, said spokes being cast as open sided channels, integral transverse webs in said channels having former edges, the sides of said channels being bent over against said former edges to form closed tubular spokes.

5. The method of making metal vehicle wheels comprising casting an integral hub, spokes and felloe, the spokes connecting the hub and felloe and being U-shaped in section, casting transverse former webs integral with said spokes and bending the sides of said U-shaped spokes over said former webs to close said channels.

6. The method of making metal vehicle wheels comprising casting integral a hub, channeled shaped spokes and a felloe, casting transverse webs integral with the bottom of each channel shaped spoke and bending the sides of the channels over to meet each other and rest on said webs.

7. The method of making metal vehicle wheels comprising casting integral a hub, channel shaped spokes and a felloe, casting transverse webs integral with the bottom of each channel shaped spoke, bending the sides of the channels over to meet each other and rest on said webs, and securing said meeting edges together.

8. In a metal vehicle wheel in combination, a hub having a substantially cylindrical periphery, a felloe having an inner periphery, spokes joining said hub periphery and felloe periphery and being cast integral therewith, each spoke being cast as a channel open on one side and having a curved bottom the ends of which bottom join the hub and felloe and straight sides on said spokes initially free from said hub and felloe.

9. In a metal vehicle wheel in combination, a hub having a substantially cylindrical periphery, a felloe having an inner periphery, spokes joining said hub periphery and felloe periphery and being cast integral therewith, each spoke being cast as a channel open on one side and having a curved bottom the ends of which bottom join the hub and felloe, straight sides on said spokes initially free from said hub and felloe, and transverse webs cast integral with the curved bottoms of said spokes and having outer edges serving as formers about which the straight sides of said spokes may be bent.

10. The method of making metal vehicle wheels comprising casting integral a hub, channel shaped spokes and a felloe, casting

transverse webs integral with the bottom of each channel shaped spoke and shearing the ends of said channels from the felloe and hub enough to allow bending the sides of the channels over to meet each other and rest on said webs.

11. The method of making metal vehicle wheels comprising casting integral a hub, channel shaped spokes and a felloe, casting transverse webs integral with the bottom of each channel shaped spoke and shearing the ends of said channels from the felloe and hub enough to allow bending the sides of the channels over to meet each other and rest on said webs so as to confine the outline of the cross section of the spokes thus formed wholly within the edges of the felloe.

12. The method of making metal vehicle wheels comprising casting integral a hub, channel shaped spokes and a felloe, casting transverse webs integral with the bottom of each channel shaped spoke and shearing the ends of said channels from the felloe and hub enough to allow bending the sides of the channels over to meet each other and rest on said webs so as to confine the outline of the cross section of the spokes thus formed wholly within the edges of the felloe and securing said sheared ends to the felloe and hub portion.

13. The method of making metal vehicle wheels comprising casting integral a hub, channel shaped spokes and a felloe, casting transverse webs integral with the bottom of each channel shaped spoke and shearing the ends of said channels from the felloe and hub enough to allow bending the sides of the channels over to meet each other and rest on said webs so as to confine the outline of the cross section of the spokes thus formed wholly within the edges of the felloe, securing said sheared ends to the felloe and hub portion and joining the meeting edges of the channels to each other.

In testimony whereof I hereunto affix my signature.

ALEXANDER MELDRUM