

(No Model.)

5 Sheets—Sheet 1.

I. MACW. BOURKE.
DRIVING MECHANISM FOR WHEELS.

No. 510,882.

Patented Dec. 19, 1893.

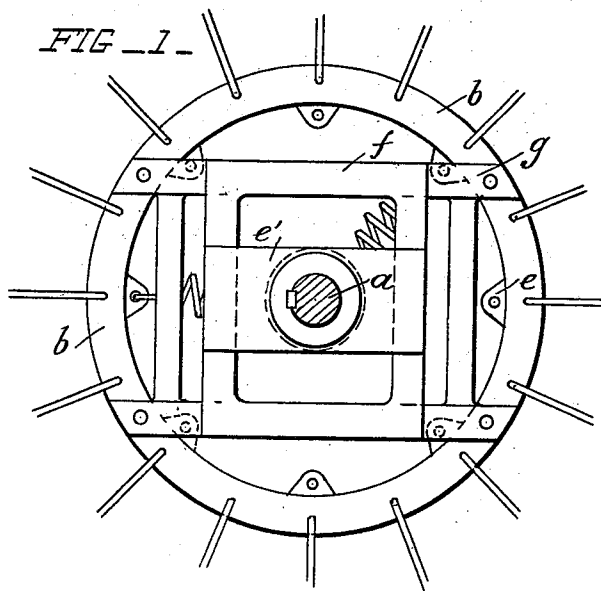
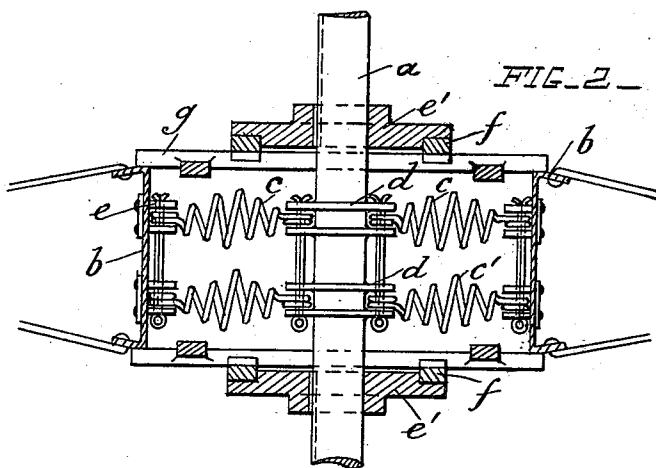
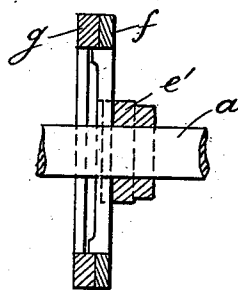


FIG. 3—



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FIG-4-

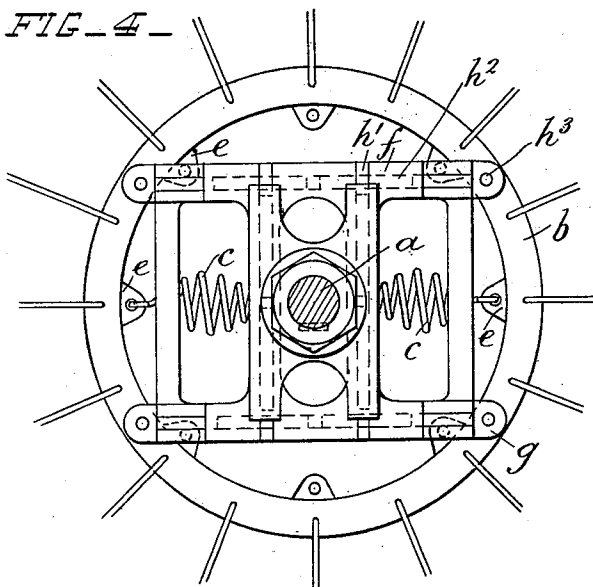


FIG-6-

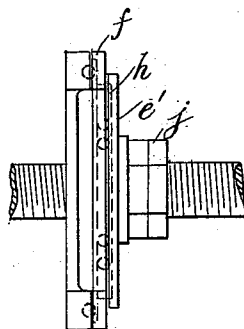
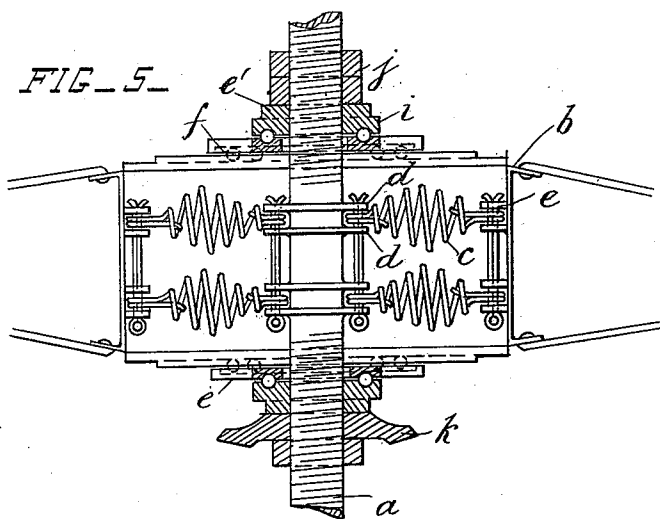


FIG-5-



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FIG. 7—

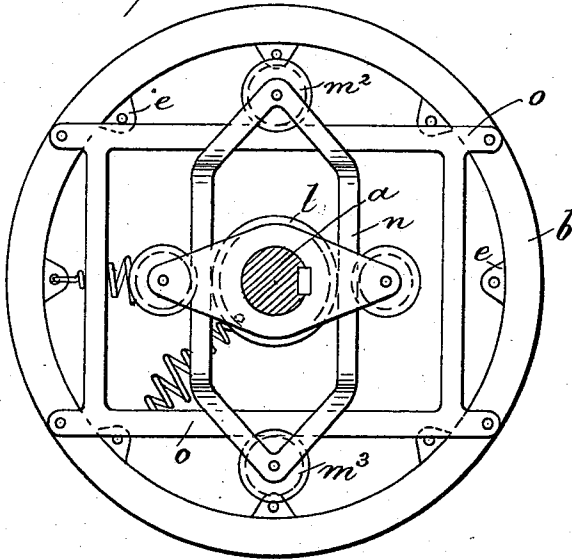


FIG. 9—

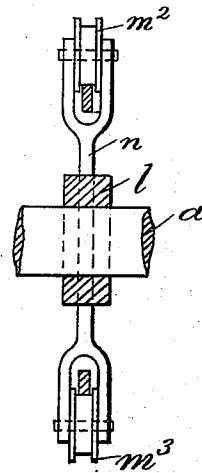
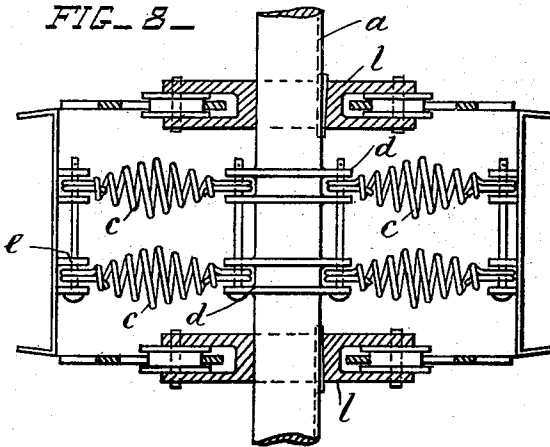


FIG. 8—



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FIG-10-

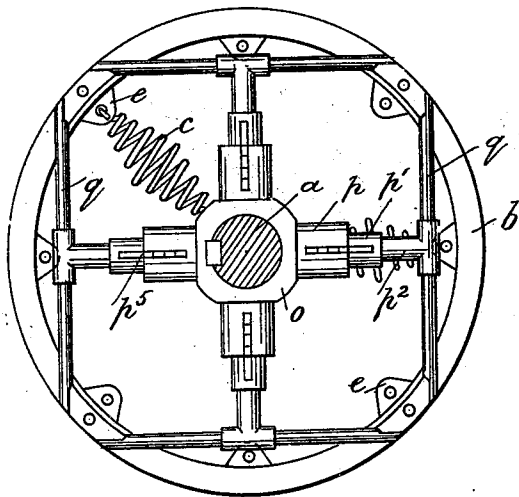
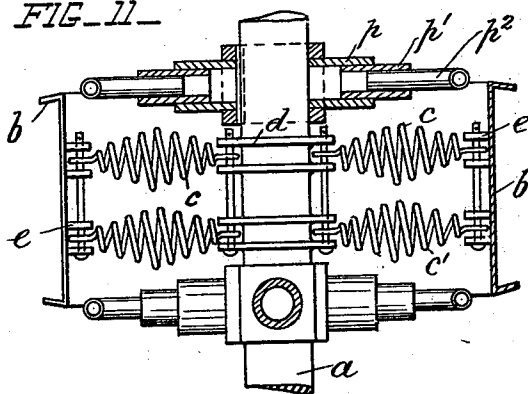


FIG-11-



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FIG. 12.

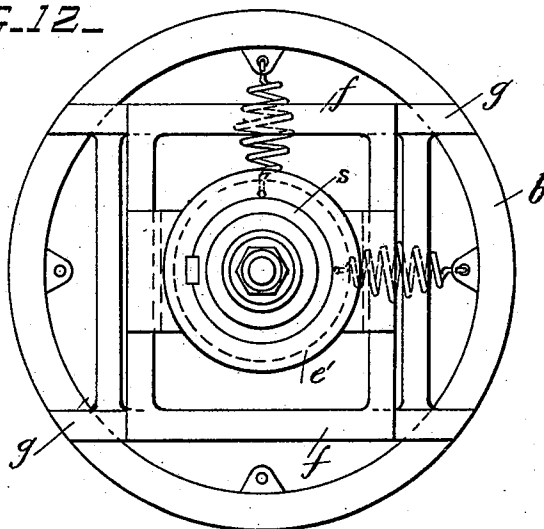
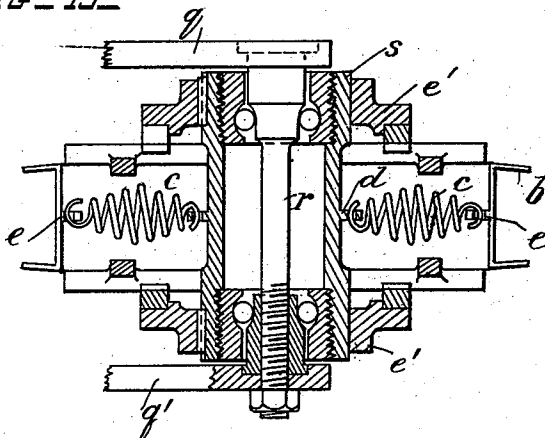


FIG. 13.



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UNITED STATES PATENT OFFICE.

ISIDORE MACWILLIAM BOURKE, OF LONDON, ENGLAND.

DRIVING MECHANISM FOR WHEELS.

SPECIFICATION forming part of Letters Patent No. 510,882, dated December 19, 1893.

Application filed March 28, 1893. Serial No. 468,069. (No model.) Patented in England September 5, 1892, No. 15,883.

To all whom it may concern:

Be it known that I, ISIDORE MACWILLIAM BOURKE, a subject of the Queen of Great Britain and Ireland, residing at 40 Redcliffe Square, London, in the county of Middlesex, England, have invented certain new and useful Improvements in Driving Mechanism for Wheels, (for which I have obtained a patent in Great Britain, No. 15,883, dated September 5, 1892,) of which the following is a specification.

My invention relates to improvements in the construction of wheels.

The invention consists in the novel construction and combination of the parts hereinafter fully described and claimed.

In the drawings: Figure 1 is a side elevation. Fig. 2 is a sectional plan; and Fig. 3 is a part sectional elevation, showing one form of the device. Fig. 4 is an elevation. Fig. 5 is a plan; and Fig. 6 is a part elevation, showing a modification of the device. Fig. 7 is an elevation. Fig. 8 is a sectional plan; and Fig. 9 is a part elevation, showing a second modification of the device. Fig. 10 is an elevation; and Fig. 11 is a sectional plan, showing a third modification of the device. Fig. 12 is an elevation; and Fig. 13 is a sectional plan, showing a fourth modification of the device.

Fig. 1 represents the combined mechanism for driving and for obtaining elasticity; the axle or axle box *a* is provided with four collars *d* and the hub *b* is made of a suitable diameter and provided with flanges to take the spokes; inside the hub brackets *e* are fixed and the springs *c* are attached to the brackets and to the collars *d* upon the axle or axle box.

In Fig. 2 two series of springs *c, c'* are shown, each series being arranged in a star form around the axle and the springs constitute the elastic medium. The driving mechanism is similar at each end of the hub and consists of a plate *e'* keyed directly to the axle or axle box *a* and free to slide upon a cross frame *f* and to drive it. The frame *f* is free to slide upon a rigid cross frame *g* which is itself firmly attached to the hub *b*. It will thus be seen that the axle *a* is free to drive the hub *b* through the compound frames *e' f* and *g* while its own position inside the hub *b* is de-

termined by the tension and compression of the springs *c, c'*.

Although I have described the apparatus as connected to the axle in the foregoing description it must be distinctly understood that the mechanism may be attached to an axle box which rotates around a fixed axle, and although I have shown a slide at each end of the hub it must be distinctly understood that the slides may be also used inside the hub, that is, resting on the cross bars or other convenient attachment from the inside of the hub and in certain cases only one set of slides on one side may be used or one set only may be used in the center of the hub. In certain cases, as may be convenient, several slides may be used in any convenient position in, upon or about the hub and the arrangement of the slides may be V shaped or of any other convenient form. In the whole of the description which follows it must be clearly understood that in all cases where the attachment of parts is described as being upon the axle such parts may be attached in a precisely similar manner to an axle box which rotates about a fixed axle.

In Fig. 4 a similar arrangement is shown. The axle *a* is provided with collars *d* and the hub *b* provided with brackets *e*, and in this case I have preferred as before to construct two collars upon the axle for each series of springs in order that each end of each spring may be made into the form of a double eye to permit pivoting and to give more bearing surface the springs are attached to the axle or axle box and to the hub in a manner such as is represented in the figures.

In Fig. 4 the primary frame *e'* is provided with grooves *h* corresponding with similar grooves *h'* upon the secondary frame *f* and the frame *f* has similar grooves *h²*, corresponding with grooves *h³* in the frame *g*; in these grooves are placed balls *i* and the object of this arrangement is to lessen the friction which would be caused by the arrangement shown in Figs. 1, 2 and 3. I prefer to divide one groove of each pair of slides into two or more parts and to place one or more balls in each division of the groove. Nuts are represented at *j* which may be used for adjusting the slides and balls to their proper relative positions, but any other suitable

mechanism may be used. k represents a chain wheel used for driving the axle a . In this case also the slide or slides may be arranged in the center of the hub instead of outside, and one, two or more such combinations of slides may be used in each wheel. The attachments of the springs and slides may be made as before to the axle or to the axle box.

Fig. 8 shows a precisely similar arrangement to that illustrated in Fig. 5, so far as the springs are concerned.

The driving mechanism shown in Figs. 7 and 8 is the same at each end of the hub and consists of a double ended lever l keyed directly upon the axle a and provided with two rollers m, m' . These rollers are free to move upon the secondary frame n provided with two rollers m^2 and m^3 . These rollers are free to move upon the third frame o which is attached to the hub b . The frame n is formed with a fork at each end, as shown in Fig. 9, in order to carry the rollers m^2 and m^3 and the movements of the axle and of the several frames are precisely similar to those previously alluded to. As before, the driving mechanism and the springs may be attached as shown to the axle or may be attached to an axle box which can rotate freely about a fixed axle, and the driving mechanism may be placed at each side of the hub as shown or at one side only or in the center of the hub and one, two or more such driving mechanisms may be used for each wheel. In these figures ball bearings may be used in substitution for rollers, and it is obvious that a recess must be provided for the balls to work in.

In Fig. 11 the arrangement of the springs is precisely similar to that already described but the driving mechanism is different. This mechanism is the same at each end of the hub and consists of a boss o keyed directly upon the axle a and provided with four tubular arms p . Each arm p has a second tube p' and the tube p' a third tube p^2 . Each arm has in this way a telescopic action, and a frame q consisting of four bars attached together at the corners forms a rigid structure attached to the hub b . The tube p^2 is of T form and is free to slide upon the bar q . Each tube is provided with a stop or pin p^4, p^5 which prevents the telescopic action exceeding a certain amount and slots are cut in the tubes through which the stops p^4 and p^5 pass. The movement of the axle inside the hub is precisely similar to that previously described. The springs and the telescopic driving arrangement may be attached to the axle as illustrated or to the axle box. Instead of four arms, two, three or more may be used and the driving mechanism may be placed at each side of the hub or in the center of the hub and one, two or more driving mechanisms may be used for each wheel. Instead of the four telescopic slides shown in the figures telescopic slides fitted with ball bearings may be used; these ball bearings would be applied to

the slides upon which the tubes run. Hinged or pivoted rods or chains so made that they cannot bend laterally may be used instead of the telescopic arrangement.

All the previous drawings apply to an axle which is to be driven direct. Figs. 12 and 13 however show a method of applying the invention to an axle which is not driven directly, for example, to the front wheel of a safety bicycle or an ordinary carriage. g, g' represent the forks which support the axle which in this case is turned down in the ordinary manner to receive ball bearings. An outside sleeve then becomes the counterpart of the axle a in the previous cases and receives a collar d for the attachment of the springs c . The hub b is precisely similar to those previously described. The driving arrangement is the same as that shown in Figs. 5 and 6. The frame e' is keyed direct upon the sleeve s and is free to slide upon the cross frame f which itself can slide upon the frame g .

In Figs. 12 and 13 although the attachment of the driving mechanism and of the springs is shown to an axle box, it is to be clearly understood that the attachment may be made direct to the axle. For the sake of clearness the fork and ball bearings are not shown in Fig. 12.

The particular forms of spring represented in the various figures are those which have been found most suitable, but it is obvious that other forms might be used without changing the general arrangement of the mechanism.

Having fully described my invention, what I claim, and desire to secure by Letters Patent, is—

1. In a wheel, the combination, with a hub-ring, a center portion—such as an axle—inside the hub-ring, and springs interposed between the said center portion and hub-ring; of a slide secured to the said hub-ring, a slide secured to the said center portion, and an intermediate slide operatively connecting the two aforesaid slides, whereby the hub-ring and center portion are rigidly connected both circumferentially and laterally and are free to move radially with respect to each other, substantially as set forth.

2. In a wheel, the combination, with a hub-ring b , a central axle a , and springs c interposed between the said parts; of the slides g secured to the hub-ring, the slides e' secured to the axle, and the intermediate slides f operatively connecting the two aforesaid slides, whereby the said hub-ring and axle are connected rigidly both circumferentially and laterally and the hub-ring is free to move radially of the axle, substantially as set forth.

In testimony whereof I have hereunto affixed my signature in the presence of two witnesses.

ISIDORE MACWILLIAM BOURKE.

Witnesses:

WILLIAM K. CANDZL,
ARTHUR WOODMAN.