(No Model.) 3 Sheets—Sheet 1.

C. S. LEDDELL.

BICYCLE.

No. 306,498. Patented Oct. 14, 1884.

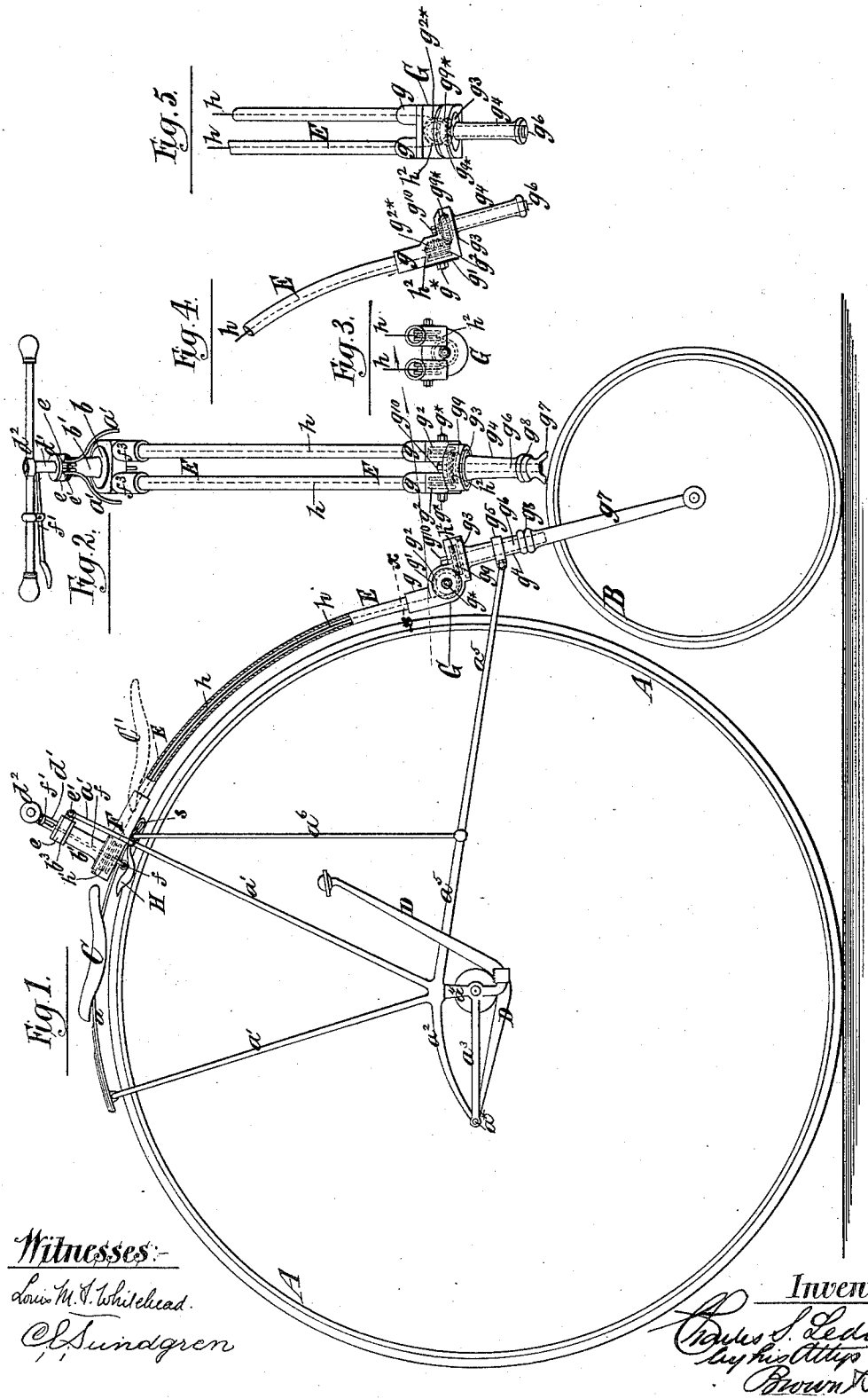


Fig. 5.

Fig. 4.

Fig. 3.

Fig. 2.

Fig. 1.

Witnesses:-
Louis M. A. Whitehead.
C. L. Sundgren

Inventor:-
Charles S. Leddell
by his Attys.
Brown & Hall

(No Model.) 3 Sheets—Sheet 2.

C. S. LEDDELL

BICYCLE.

No. 306,498. Patented Oct. 14, 1884.

Fig. 6.

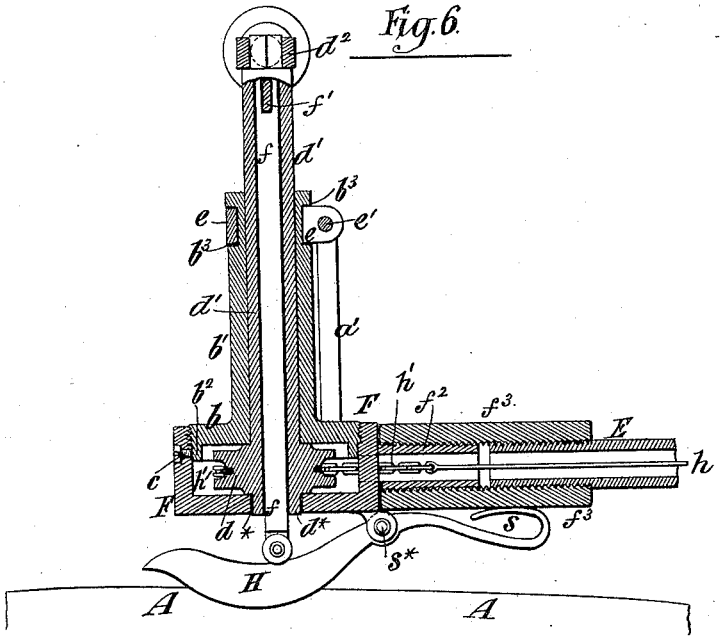
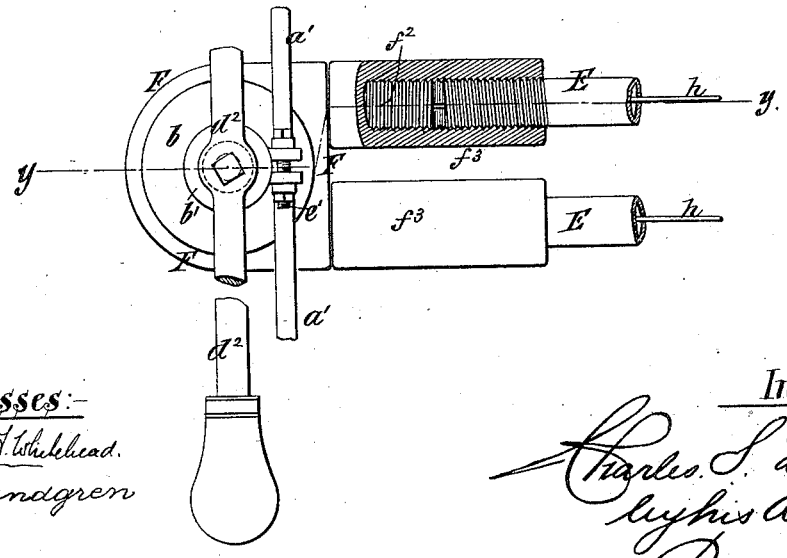


Fig. 7.



Witnesses:-
Louis M. S. Whitehead.
C. L. Sundgren

Inventor:-
Charles S. Leddell
by his attys.
Brown & Hall

(No Model.) 3 Sheets—Sheet 3.

C. S. LEDDELL.

BICYCLE.

No. 306,498. Patented Oct. 14, 1884.

Fig. 11.

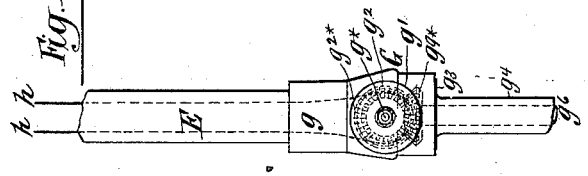


Fig. 10.

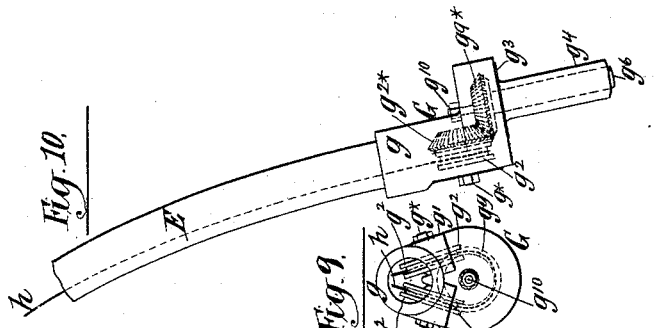
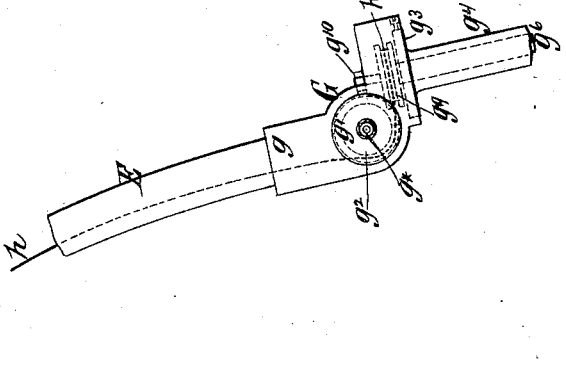


Fig. 9.

Fig. 8.



Witnesses:-
Louis W. Whitehead.
C. L. Sundgren

Inventor:-
Charles S. Leddell
by his attys.
Brown & Hall

UNITED STATES PATENT OFFICE.

CHARLES S. LEDDELL, OF MORRISTOWN, NEW JERSEY.

BICYCLE.

SPECIFICATION forming part of Letters Patent No. 306,498, dated October 14, 1884.

Application filed May 20, 1884. (No model.)

To all whom it may concern:

Be it known that I, CHARLES S. LEDDELL, of Morristown, in the county of Morris and State of New Jersey, have invented a new and useful Improvement in Bicycles, of which the following is a specification.

My invention relates to those bicycles in which the large driving-wheel is journaled in or supports a fixed frame, from which extends a tubular backbone, curved to correspond approximately to the circumference of the driving-wheel, and through which extend connections for controlling the smaller steering-wheel, which is at the lower end of the backbone.

The invention is applicable to such machines, whether the small steering-wheel is in front of or behind the driving-wheel, and whether the driving-wheel is operated by cranks or by a treadle-and-ratchet movement.

The invention consists in novel combinations of parts and details of construction, hereinafter described, and pointed out in the claims.

In the accompanying drawings, Figure 1 is a side elevation, partly in section, of a machine embodying my invention. Fig. 2 is a front view of the backbone and steering apparatus thereof. Fig. 3 is a sectional view of the backbone on the dotted line *x x*, Fig. 1. Figs. 4 and 5 are respectively side and front views of the lower portion of the backbone, illustrating a modification in the mechanism for transmitting motion to the swiveled fork, in which is the steering-wheel. Fig. 6 is a sectional view, on a larger scale, illustrating the construction of the upper part of the frame from which extends the backbone, also showing the brake and the means for operating it. Fig. 7 is a plan of the parts shown in Fig. 6. Figs. 8 and 9 are a side view and a sectional plan of the lower end portion of a backbone consisting of a single curved tube; and Figs. 10 and 11 are side and front views of the lower portion of a backbone consisting of a single tube, and illustrating the same mechanism for operating the swiveled fork of the steering-wheel which is shown in Figs. 4 and 5. Figs. 8, 9, 10, and 11 are drawn to a larger scale than Figs. 1 to 5, and Figs. 6 and 7 are drawn to a still larger scale.

Similar letters designate corresponding parts in all the figures.

A B designate, respectively, the large driving-wheel and the smaller steering-wheel, which latter is in front of the driving-wheel, as here shown. These wheels are only shown in outline, and may be of any suitable or ordinary construction. The driving-wheel A is journaled in, or, in other words, supports, a fixed frame, which may be of any suitable construction. It consists, as here shown, of a spring-piece, *a*, which carries the saddle C, pairs of arms $a' a'$, converging downward from the top of the frame, portions $a^2 a^3 a^4$, which sustain the wheel-boxes and form supports, to which are pivoted at a^* treadles D and braces or arms a^5, extending toward the steering-wheel B. The driving-wheel A might be operated by cranks; but in this example of my invention the treadles D, with any suitable ratchet-movement, are employed for that purpose. I have not shown this ratchet-movement in detail, as it forms no part of my invention.

E represents the backbone or spine of the machine, which is curved to approximately correspond to the curvature or circular form of the driving-wheel A. This backbone consists of one or two tubes curved as described, and extending from a box or top piece, F, of the frame. The backbone is provided with a box or frame, G, at the lower end.

The backbone (shown in Figs. 1 to 7, inclusive) consists of two similarly-curved tubes, and I will first describe the construction of the head or top piece, F, and the manner of connecting with it the tubes of the backbone, reference being had to Figs. 1, 2, 6, and 7. The two latter figures show these features most clearly, Fig. 6 being a section on the line *y y*, Fig. 7. The box F has its bottom formed integral with it, and its top is closed dust-tight by a screw-plug or plate, *b*, having formed integral with it a long sleeve or hub, *b'*.

Below the screw-thread of the plug or plate *b* is a circular projection, b^2, which fits the circular interior of the box, and the plug or plate is secured against turning by a set-screw, *c*, inserted from the outside of the box, as shown in Fig. 6.

In the box F is fitted a chain-wheel or other wheel, *d*, having a downwardly-projecting journal, d^*, fitting a bearing, *, in the bottom of the box F, and an upwardly-projecting

shaft, d', fitting and having a bearing in the sleeve or hub b'. The plug or cap-plate b is screwed down until it confines the shaft and wheel d' d against end-play, and is then secured by tightening the set-screw c.

In the upper portion of the sleeve or long hub b' is an annular groove or recess, b^3, and therein is fitted a divided clamp or split collar, e, which, by a nut or bolt, e', may be tightly clamped in the groove or recess b^3. Two opposite arms or rods, a', of the fixed frame extend downward from the clamping-bolt e', and are thus connected with the top of the sleeve or long hub b'. From said box F braces a^6 extend downward to the forwardly-projecting arms or braces a^5. The wheel and shaft d d' are hollow throughout, and to the upper end of the shaft is applied the steering-handle d^2. (Shown in Fig. 2.)

H designates a brake, which is attached to the under side of the box F by a pivot, s^*, and has a spring, s, which is constructed to hold the brake normally out of contact with the driving-wheel A.

Extending through the hollow shaft d' and wheel d is a push-rod, f, the lower end of which bears upon the brake H, and which may be pushed or forced down to apply the brake by a brake-lever, f', fulcrumed to the under side of the steering-handle d^2, as shown in Fig. 2.

The means employed for taking up the wear and for elongating or contracting the backbone to properly adjust the machines may be at either end of the backbone, but as here shown are at the upper end.

From the box F project threaded nipples f^2, and the ends of the two tubes constituting the backbone E are correspondingly-threaded, but with a pitch the reverse of the nipples f^2. The nipples and tubes are connected by sleeves or nuts f^3, having each right and left hand threads, and by turning the said sleeves or nuts, as desired, the backbone may be brought to just the length required. The box or frame G at the lower end of the backbone is of angular shape, and has sockets g into which the ends of the tubes of the backbone are screwed. Opposite these sockets are cavities which open on opposite sides, and are closed dust-proof by caps or bonnets g'. In each cavity is a wheel, g^2, and each wheel is journaled upon a bolt, g^*, whereby the adjacent cap or bonnet is secured.

In the box or frame G is likewise a cavity which extends outward from the portion of the frame just described, and opens at the bottom. This latter cavity is closed by a cap or plug, g^3, having a long sleeve or hub, g^4, to which the ends of the braces or arms a^5 are secured by a split collar or clamp, g^5, and in which is journaled a shaft, g^6. The shaft g^6 has fixed to its lower end a fork, g^7, wherein is journaled the steering-wheel B, and on which is a shoulder, g^8, which bears against the end of the long hub or sleeve g^4. The shaft g^6 has a wheel, g^9, at the upper end. The shaft g^6 is therefore held against longitudinal movement in either direction in the cap or plug and sleeve g^3 g^4 by reason of the wheel g^9 bearing against the upper side of the cap or plug and the collar or shoulder g^8 on the shaft bearing against the end of the sleeve or hub g^4.

Through the tubes of the backbone E extend curved rods h h, connected at their upper ends to a chain or flexible connection, h', which engages with the wheel d, and connected at their lower ends by a chain or flexible connection, h^2, which is deflected around the pulleys or wheels g^2, and partly encircles the wheel g^9, which it turns in steering. The cap or plug g^3 may be screwed into the box or frame G and there secured by a set-screw like the cap or plate b, before described. In the box or frame G, opposite the end of the shaft g^6, is a set-screw, g^{10}, which regulates the position of the cap or plug g^3 by bearing against the end of the shaft. The cap or plug g^3 is screwed in until arrested by the set-screw g^{10}, and by adjusting the latter the wheel g^9 on the steering-wheel shaft g^6 will be brought into proper relation to the wheels g^2 for the working of the connection h^2.

In lieu of employing rods h the entire steering-connections may be chains or flexible connections, and in this example of my invention such connections act through tension.

By adjusting the length of the backbone, as above described, the steering connections are made taut, and by adjusting the screw g^{10} the shoulder g^8 is brought to a proper thrust bearing on the end of the sleeve or hub g^4. By turning the steering-handle d^2 in one or other direction the shaft and fork g^6 g^7 are turned and the machine steered.

One important advantage of the combination and construction above described is that that end of said handle which is turned or pulled toward the rider always rises, and hence does not interfere with his knees. This is due to the fact that the shaft or spindle d' and its bearing b' are inclined forwardly relatively to the saddle C, which is immediately over the driving-wheel A. If it be desired to operate the machine with the steering-wheel B behind, a saddle, C', might be mounted as shown by dotted lines in Fig. 1; but I here make no claim thereto.

In the modification of my invention shown in Figs. 4 and 5, a single wheel, g^2, is substituted for the two idlers g^2 before described with reference to Figs. 1, 2, and 3, and the cavity in the box or frame G which contains this wheel is closed by a cap, g', secured by a bolt, g^*, on which said wheel is journaled. In this case the wheel g^2 is fast with a bevel-wheel, g^{2*}, and for the wheel g^9 before described a bevel-wheel, g^{9*}, is secured on the shaft g^6. The flexible connection h^2 in this example of the invention partly encircles the wheel g^2, and by turning it acts through the bevel-wheels g^{2*} g^{9*} to turn the fork-shaft g^6.

It will be observed that the steering-wheel shaft g^6 is in the same vertical plane as the driving-wheel; and it will be seen that the axis of said shaft, if prolonged, will intersect the pin or axle on which the steering-wheel turns. The steering-wheel supports the backbone through its pin or axle, and consequently the point of support of the backbone by the steering-wheel will always be in the plane of the driving-wheel. This being the case, it follows that there will be no extra tendency of the machine to cant or fall sidewise in steering or mounting the machine, because the point of support of the backbone by the steering-wheel will always be in the same plane as the driving-wheel.

I do not claim, broadly, as my invention a curved tubular backbone, in combination with the driving and steering wheel, and a fixed frame for the driving-wheel.

In Figs. 8 and 9 the construction of all parts is the same as before described with reference to Figs. 1, 2, and 3, except that the idler-wheels g^2 do not run in parallel planes, but converge toward the point at which the connection h^2 comes upon them. Both connections h h may then be carried through a single curved tube, E, which alone forms the backbone.

Figs. 10 and 11 illustrate the same construction as Figs. 4 and 5, save that both connections h h are carried through a single tube, E, which constitutes the tubular and curved backbone.

The chains or other flexible connections h' h^2 may be made to engage with the wheels around which they pass, or they may be fastened to said wheels by a screw or pin inserted through the chain or other connection and into the wheel. In either case any turning of the wheel d would affect the movement of the connection h', and such movement would be transmitted by the connection h^2 to the wheel around which the latter passes.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. The combination, with the driving and steering wheels and a fixed frame for the driving-wheel, of a tubular curved backbone capable of being elongated or contracted to properly fix its length, a steering shaft or handle at the upper end of the backbone, and connections extending through said curved backbone and serving to transmit power from the steering shaft or handle for controlling the steering-wheel, substantially as and for the purpose herein described.

2. The combination, with the large driving-wheel A, the smaller steering-wheel B, and a fixed frame for the driving-wheel, of a curved tubular backbone, E, secured to said fixed frame, and provided at the lower end with a box or frame, G, a steering shaft or spindle at the upper end of said backbone, a steering-wheel shaft at the lower end of the backbone having a thrust bearing in the box or frame G, wheels on said shafts, and flexible connections extending through said backbone and serving to transmit power from the steering shaft or spindle to the steering-wheel shaft, substantially as herein described.

3. The combination, with the driving and steering wheels and a fixed frame for the driving-wheel, of a backbone extending from said frame, and composed of two tubes curved to approximately correspond to the driving-wheel, a steering shaft or handle at the upper end of said backbone, and rods or chains extending one through each of said tubes and serving to transmit power from said steering shaft or handle to control the steering-wheel, substantially as and for the purpose herein described.

4. The combination, with the driving and steering wheels, a fixed frame for the driving-wheel, and a tubular backbone curved to correspond to the driving-wheel, of a brake arranged to act upon said driving-wheel, a hollow steering shaft or spindle surmounted by a handle, connections extending through said tubular backbone and serving to transmit power from the steering shaft or spindle to control the steering-wheel, a brake-operating rod or push-piece movable within said shaft or spindle, and a brake-applying lever adjacent to the steering-handle and serving to actuate said rod or push-piece to apply the brake, substantially as and for the purpose herein described.

5. The combination, with the driving and steering wheels A B, the fixed frame for the driving-wheel, and the curved tubular backbone E, of the brake H, and its spring s, the hollow steering-shaft d', and handle d^2, connections extending through the curved tubular backbone and serving to transmit power from the steering-shaft to control the steering-wheel, the push-rod f, and the brake-applying lever f', all substantially as herein described.

6. The combination, with the driving and steering wheels and a fixed frame for the driving-wheel, of the box or frame F, the cap or plate b closing said box or frame and having the sleeve or hub b', the wheel d, having the journal $d^{\times}$, and steering-shaft d', fitting bearings in said box or frame and sleeve or hub, the curved tubular backbone, and steering-connections receiving motion from said shaft or wheel and extending through said curved backbone, substantially as and for the purpose herein described.

7. The combination of the box or frame F, the cap or plate b, screwed into said box or frame and having the circular projection b^2, and the set-screw c, substantially as herein described.

8. The combination, with the wheels A B, of the box or frame F, the cap or plate b for closing the same, provided with the sleeve or hub b', the curved tubular backbone E, flexible connections for operating the steering-wheel B, extending through said backbone, a fixed frame for the wheel A, comprising arms

or braces a', and a clamp, e, whereby said arms or braces a' are connected with the sleeve or hub b', substantially as herein described.

9. The combination, with the box or frame G, open at the bottom, of the closing-cap, and hub or sleeve g^3 g^4, the fork-shaft g^6 g^7 g^8, journaled therein, and the set-screw g^{10}, substantially as herein described.

10. The combination, with the driving-wheel A, steering-wheel B, a fixed frame for the driving-wheel, and a saddle, C, mounted on the frame over said driving-wheel, of the curved tubular backbone E, having at its upper end the box or frame F, the steering-shaft d', inclined forward relatively to the seat C, and provided with handles d^2, and connections extending through the tubular backbone to transmit power from said steering-shaft for controlling the steering-wheel, substantially as herein described.

11. The combination, with the wheels A B, and the curved tubular backbone provided with boxes F G at its upper and lower ends, of the steering-spindle d', and pulley d, journaled in box F, the steering-wheel shaft g^6, and its pulley g^9, journaled in the box G, the pulley g^2 in the box G, and flexible connections extending through the curved tubular backbone between the pulleys d and g^9, deflected over the pulleys g^2, substantially as herein described.

C. S. LEDDELL.

Witnesses:
FREDK. HAYNES,
EMIL SCHWARTZ.