(No Model.) 2 Sheets—Sheet 1.

D. H. RICE.

TRICYCLE.

No. 326,244. Patented Sept. 15, 1885.

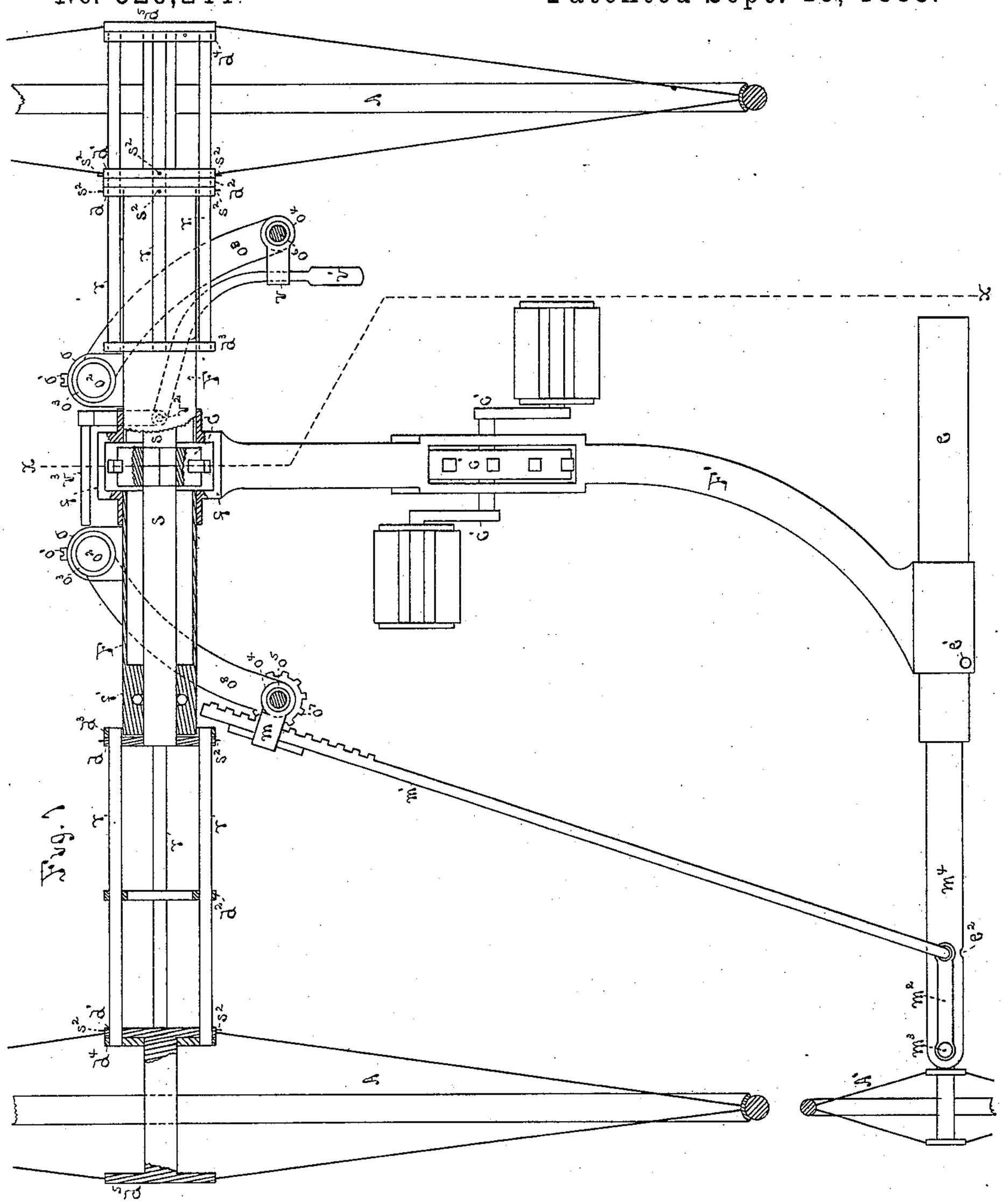

Fig. 1.

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(No Model.) 2 Sheets—Sheet 2.

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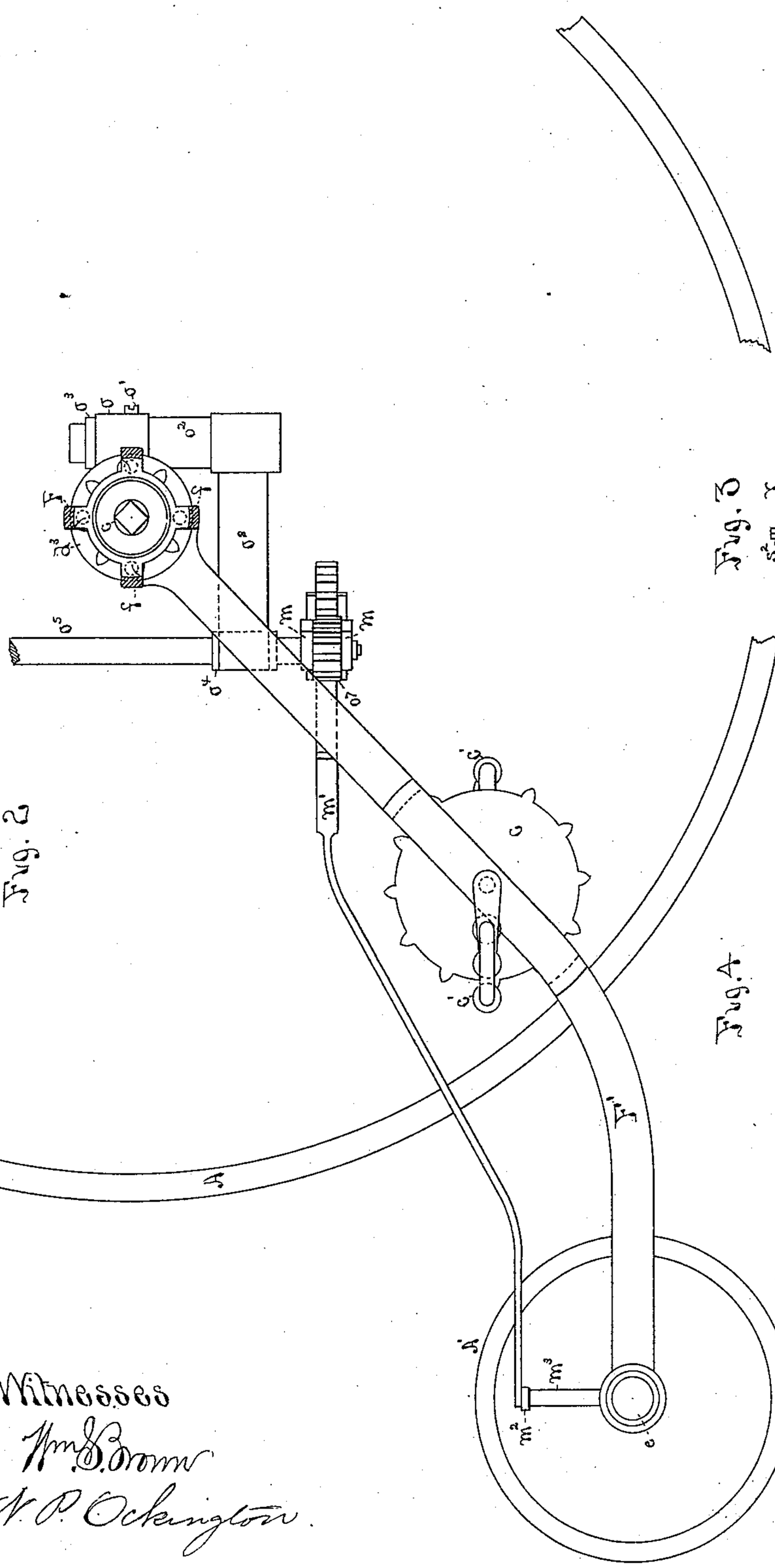

Fig. 2.

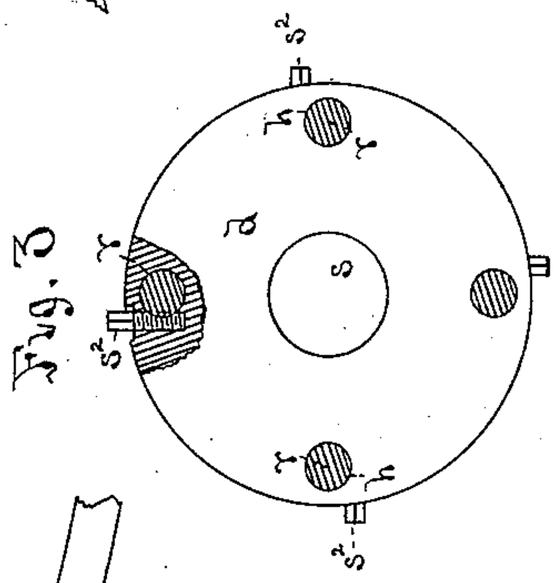

Fig. 3.

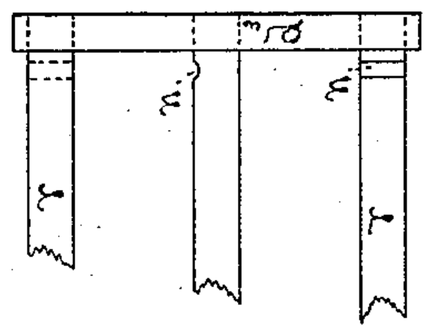

Fig. 4.

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UNITED STATES PATENT OFFICE.

DAVID HALL RICE, OF LOWELL, MASSACHUSETTS.

TRICYCLE.

SPECIFICATION forming part of Letters Patent No. 326,244, dated September 15, 1885.

Application filed May 27, 1885. (No model.)

To all whom it may concern:

Be it known that I, DAVID HALL RICE, of Lowell, in the county of Middlesex and State of Massachusetts, have made a new and useful Improvement in Tricycles and other Similar Wheeled Vehicles, of which the following is a specification.

My invention relates to tricycles and other similar wheeled vehicles; and it consists in certain novel and useful combinations of the various parts of the same, with the object of enabling the breadth of the track made by the wheels of the same to be varied or set to different gages, substantially as hereinafter described and claimed.

Heretofore it has been found expedient to make such vehicles as narrow as convenient for the rider to sit on and work the operative parts—such as treadles, steering-gear, brake, &c.—in order that they may be stored in as compact a space as possible and take up as little breadth as possible in traversing paved or smooth streets; and it has been found possible to reduce the gage of the wheel-treads to about thirty inches, and the outside horizontal distance across the two opposite wheels to thirty-six or thirty-seven inches. It is, however, a well-known fact that it is difficult to propel such machines over many country roads, because only two of the wheels can be brought to run in the smooth tracks made by ordinary wheeled vehicles—viz., the steering-wheel and one driving-wheel—the other driving-wheel traveling over the rough portions of the road between the wheel-tracks, because the same are a much greater distance apart than the tricycle-wheels of the gage mentioned, often being fifty-six inches apart. Again, even when the tricycle is made as narrow as above mentioned it will not pass through many ordinary gates or doors.

It is to overcome these disadvantages that my improvements are devised, and they may either be employed to make the vehicle narrower than the width mentioned, or to increase its breadth to that of the wheel-tracks of ordinary road-vehicles.

In the drawings, Figure 1 is a top plan view of a portion of a tricycle, partly in section, provided with my improvements. Fig. 2 is a section of the same on the dotted line *x x* of Fig. 1. Fig. 3 is a detail view of part of the telescoping shaft, showing how the members are locked together. Fig. 4 is a side view of part of the same, showing the same thing.

A A are the two large wheels of the tricycle, which are driven by the central driving-clutch and propel the vehicle.

A′ is the steering-wheel, mounted upon an arm projecting forward and downward from the tubular frame F, which arm is lettered F′. The tubular frame F is in two parts, connected by arched straps or bars *f f*, to allow space for the clutch C, which drives the divided wheel-shaft *s s*. This clutch C is the same patented to me in Letters Patent No. 316,061, dated April 21, 1885, and this patent is referred to for the details of its construction. The shaft *s s* is supported in the outer ends of the tubular frame F by the well-known ball-bearings *f′*; but any others may be employed. To the outer ends of shaft *s s* are firmly attached two disks, *d d*, which revolve with the shafts. The faces of these disks are turned perfectly true in planes at right angles to the axis of shaft *s s*, and they extend outward beyond the tubular ends of frame F to some distance. Through each disk *d* are bored four equidistant holes, parallel with the axis of shaft *s* and outside the periphery of frame F, and these holes are lettered *h h* in Fig. 3. Through these holes slide four rods, *r r*. The inner spoke-flange of each wheel *d′ d′* has four similar holes made through it in line with those in the disks *d d*, and the rods *r r* pass through the wheel-disks by means of these holes in them. The outer and inner faces of these wheel disks are trued up in planes perpendicular to the axes of these holes. The hub of the wheel between the outer and inner spoke-disks is made no larger in diameter than the tubular frame F. The four rods *r r* on the end of shaft *s* on either side of the machine are formed into the telescoping part of the shaft as follows: Before they are passed through the disks *d d′*, as described, a disk, d^2, is brazed upon the center of these rods by passing them through holes in it which register and are in line with the holes in disks *d d′*. After passing the inner ends of rods *r r* through the holes in disk *d* a ring disk, d^3, is slipped over the tubular frame F, having a hole in its center to receive the latter, and four holes in it corresponding and in line with the four in disks *d*

d'. Into these four holes in disk d^3 the inner ends of rods r are passed and firmly secured, so that the face of the disk toward disk d shall be perpendicular to the axes of the rods. The hole in the center of disk d^3 is considerably larger than the tubular frame F, which it surrounds. The outer ends of the rods r r are passed through the wheel, spoke-flange, or disk d' before it is attached to the wheel, and a ring-disk d^4 is attached to the outer ends of these rods by four holes, as before described, so that its faces shall be perpendicular to the axes of the rods. The hole in the center of disk d^4 is larger than the central part of the wheel-hub, and is next slipped over the latter, and the disk d' is secured to the hub so that its faces shall be in planes parallel to the tread of the wheel. The rods r r are now in the position shown in Fig. 1, in which they are firmly held together by the disks d^3 and d^4 at their ends and the disk d^2 at their middle part, and slide freely through disk d, which connects them to the shaft s, and through disk d', which connects them to the wheel A. These four rods thus form in their outer parts an extension of the shaft s, telescoping into the space between the spoke-flanges of the wheel-hub, and in their inner division from disk d^2 an extension of the shaft telescoping around the frame F and shaft-bearing f'. When the faces of disks d d' d^2 are brought together, as shown at the right-hand side of Fig. 1, the wheel is closed and held in a plane at right angles to the axis of shaft s. When the faces of disks d d^3 and d' d^4 are brought together, the wheel is opened, and is held in like position with relation to the shaft. This effect is greatly assisted by making the faces of the disks true up to the shaft when brought together, as described, but it may be accomplished by properly fitting the rods r r in the holes in disks d d' in which they slide, and the collars d^3 d^4 around the frame and the central part of the wheel-hub over which they slide, respectively. It will also be observed that one part of the telescoping shaft may be used without the other—as, for instance, the part outside of disk d^2 may be slid out or in without moving the part inside of that disk, or vice versa.

In order to secure the compound telescoping-shaft in position when drawn out or in, I have adopted the following mechanism: In the collar d (Figs. 3 and 4) are made radial holes, passing inward, so that a portion of each shall be cut by the circumference of a hole, h, as shown. These radial holes are tapped out with a screw-thread, and a screw made with a slightly tapering body is fitted to each, as at s^2 s^2. In each of the rods r r, (Fig. 4,) at the place or places where it is desired to secure them to the disk d, is made an indentation or depression, n n, into which the screw s^2 will fit, wedging as it is turned home. These depressions are also so made that the screws s^2 s^2 will draw disk d^3 or d^2 against the disk d firmly when adjusted against the latter. Besides being a very powerful fastening, the screws s^2 s^2 possess the advantage that they cannot be driven home until the notches of the rods r are brought to register with them, and the operator will not be liable to wrongly adjust the respective parts. The disks d' d' are provided with similar screws, and the parts of rods r r sliding through them with smaller notches to secure them to each other.

The outer spoke-disks, d^5 d^5, may be employed to assist in truing up the wheel when closed, if desired, by bringing their inside flat faces against the outer faces of disks d^4 d^4.

I do not intend to confine my invention to the precise form of telescoping the shaft within the hub of the wheel shown in the drawings, as it is evident that it may be modified somewhat, and the space within the hub of the expansion spoke-wheel still utilized for that purpose. The part of the telescoping-shaft sliding over the frame F may also be modified in form without departing from the spirit of my invention—as, for instance, it may be tubular and confined to disk d by a spline and groove; but I prefer the construction shown.

When the tricycle is to be narrowed, so as to enter doors of less than thirty-six inches in width, it becomes necessary to move the steering-handle and its connected mechanism on one side of the machine and the handle and brake on the other inward toward the center of the machine, to allow the wheels A A to be telescoped inward sufficiently, which is accomplished as follows: On the rear side of the tubular frame F are attached two sleeves, o o, provided with set screws o' o' through them. In these sleeves are fitted short vertical rods o^2 o^2, so as to turn therein, supported by collars attached thereto, o^3 o^3, resting on top of the sleeves. From the lower ends of these rods curved arms o^8 o^8 project sidewise and forward, as shown, so as to be out of the way of the limbs of the rider, and at their outer ends sustain vertical tubes o^4 o^4. The left-hand tube o^4 serves as a bearing for the shaft of the steering-handle, (Figs. 1 and 2,) and the right-hand one as a socket for the handle on that side, these shafts being shown at o^5 and o^6. The shaft o^5 carries at its lower end a pinion o^7. Above and below this pinion on the shaft o^5 are pivoted the ends of a strap, m, so as to swing freely around the pivoting. This strap extends radially from the shaft and incloses the steering-bar m', holding it in place at that end, so that its rack will mesh with the teeth of pinion o^7, and the strap is elongated horizontally behind the bar to guide it in its reciprocating motion, as shown. The other end of the steering-bar is attached to an arm, m^2, which in turn is journaled upon the pivot m^3 in the rod m^4, to which pivot the axle of the steering-wheel A' is attached. The hub of the steering-wheel revolves around this axle, and the steering is done in the usual manner. When it is desired to remove the steering-shaft o^5 toward or away from the center of the vehicle, to telescope the wheel out or in on that

side, the set-screw o' is loosened, and the arm o^8 is swung around to the desired position. As the strap m is pivoted at the end of this arm, it will allow this to be done without disturbing the relation of the rack-teeth of the steering-bar to the teeth of the pinion o^7; or, in other words, these parts automatically adjust themselves to each other. It is evident that a slide might be used to move the pinion out and in with the same effect, provided the strap m be pivoted to the pinion-shaft. The handle-shaft o^6 on the other side of the machine is provided with a similar strap, v, pivoted upon it and surrounding the brake-handle v', so as to allow the latter to play up and down therein, and the brake-handle is pivoted so as to move in and out horizontally by the pivot v^2, (shown in dotted lines,) while it is made to turn the brake-rod v^3 vertically. The brake-rod is therefore free to swing in and out with the attached arm o^8, as the latter is adjusted in position, in the same manner as the steerer-arm on the opposite side of the machine.

As the steering-wheel will require adjusting to and from the center line of the machine to have its track with the wheel A on that side, I provide the following adjustment for that purpose: The arm F′ carries the sleeve e at its outer end. Through this sleeve the rod m^4, which carries the steering-wheel, slides transversely of the machine. A set-screw, e', and one or more notches, e^2, serve to secure the rod m^4 in the desired positions to have the steering-wheel track with the one behind it, this set-screw working in the notches as the screws s^2 work with the notches in the sliding rods r, as before described. The pivoted strap m allows of this being done without disturbing the adjustment of the steering-bar m' and pinion o^7 to each other.

It is obvious that instead of four rods, r r, being combined to form the telescoping part of the shaft of the wheel A, two or three such rods may be used in substantially the same manner, or even a greater number than four, without departing from the spirit of my invention.

The machine is driven by the usual metal chain-strap connecting the gear-teeth on the outside of clutch C with the sprocket-wheel c and cranks c' c', and it is to be provided with the usual central seat for the rider, attached to the frame over the clutch, which is not shown in Fig. 1, as it would obstruct the view of the shaft and other parts here in question.

What I claim as new and of my invention is—

1. The combination of the vehicle-frame, the shaft s, journaled therein, and an extension of said shaft projecting into the hub of the wheel A, and adapted to allow the wheel to slide outward and inward upon the same, the said shaft-extension and wheel revolving together, substantially as described.

2. The combination of the vehicle-frame, the shaft s, journaled therein, the extension portion of said shaft revolving with and sliding upon the journaled portion inward and outward around the latter and its bearing, and the wheel A, attached to and turning with the shaft, substantially as described.

3. The combination of the vehicle-frame, the shaft s, journaled therein and provided with the disk d, attached thereto, the extension of said shaft attached to and projecting from said disk into the wheel-hub, and provided at its outer end with the attached disk d^4, and the wheel-hub provided with the disk d', and adapted to slide to and fro upon said extension and have the faces of its disk or disks brought against the faces of those attached to said shaft and extension, said wheel revolving with the latter and said shaft, substantially as described.

4. The combination of the vehicle-frame, the shaft s, journaled therein and having the attached disk d, the portion of said shaft revolving with and sliding upon the journaled portion and its disk inward and outward around the bearing of the latter provided with the disk d^3, adapted to be brought against disk d, and the wheel A, attached to and revolving with said sliding portion of said shaft and the latter, substantially as described.

5. The combination of the vehicle-frame, the shaft s, journaled therein and having the disk d attached thereto, the rods r r, attached to said disk and extending and adapted to slide through the wheel-disk d', and having the disk d^4, attached thereto within the hub of the wheel, substantially as described.

6. The combination of the vehicle-frame, the shaft s, journaled therein and having the attached disk d, the wheel A, having attached thereto the disk d', and the rods r r, projecting and adapted to slide inward from the latter through said disk d and around its journal-bearing, and provided upon their inner ends with the attached disk d^3, substantially as described.

7. The combination of the vehicle-frame, the shaft s, journaled therein and provided with attached disk d, the wheel A, and the rods r r, extending and sliding through the wheel-disk d' and into the wheel-hub in one direction and through the shaft-disk d and around its journal-bearing in the opposite direction, and provided at each end with suitable stops or disks for confining their ends within said wheel-hub and outside of said journal-bearing, substantially as described.

8. The combination of the vehicle-shaft extension formed of rods r r, said rods being provided with notches or depressions n n, with a disk or collar provided with holes fitting around and sliding over said rods, and screws in said disk passing transversely through a portion of said holes and engaging with said notches, substantially as described.

9. The combination of the vehicle-frame provided with bearings f f, stationary with relation to each other, the shaft s, journaled therein and provided with a sliding or telescoping

extension, and the wheel A, attached to said extension and moving out and in therewith, said shaft, extension, and wheel all attached and revolving together, substantially as described.

10. The combination of the vehicle-frame, the brake-lever v', pivoted to move horizontally outward and inward and remain rigid vertically, the swinging arm o^8, carrying the handle-shaft o^6 and mounted in bearings on said frame, and the strap v, embracing said brake-lever and pivoted to arm o^8, substantially as described.

11. The combination of the vehicle-frame F F′ with the extensible shaft mounted in bearings therein and carrying the wheel A, and the wheel A′, mounted upon the rod m^4, adjustable laterally in said frame, the said wheels being capable of adjustment to travel the same track, substantially as described.

12. The combination of the vehicle-frame F F′, the steering-wheel A′, attached to the laterally-adjustable bar m^4, and provided with pivot m^3 and crank-arm m^2, the steering-bar m', the pinion o^7, having its shaft o^5 mounted in bearings attached to said frame, and the strap m, embracing said bar and pivoted upon said shaft, substantially as described.

13. The combination of the vehicle-frame, the shaft s, journaled therein and provided with disk d at its end, extending outward radially beyond the shaft-journal, the tubular extension of said shaft sliding inward through or upon said disk and around the projecting end of said shaft-journal, and the handle-shaft o^5 or o^6, mounted alongside of said extension upon arm o^8 o^8, attached at its inner end to said frame beyond the path of said tubular shaft-extension and extending outward and around the said path behind the front side of said frame, beneath the rider's seat, substantially as described.

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