(No Model.) 3 Sheets—Sheet 1.

D. H. & L. H. RICE.

VELOCIPEDE.

No. 348,057. Patented Aug. 24, 1886.

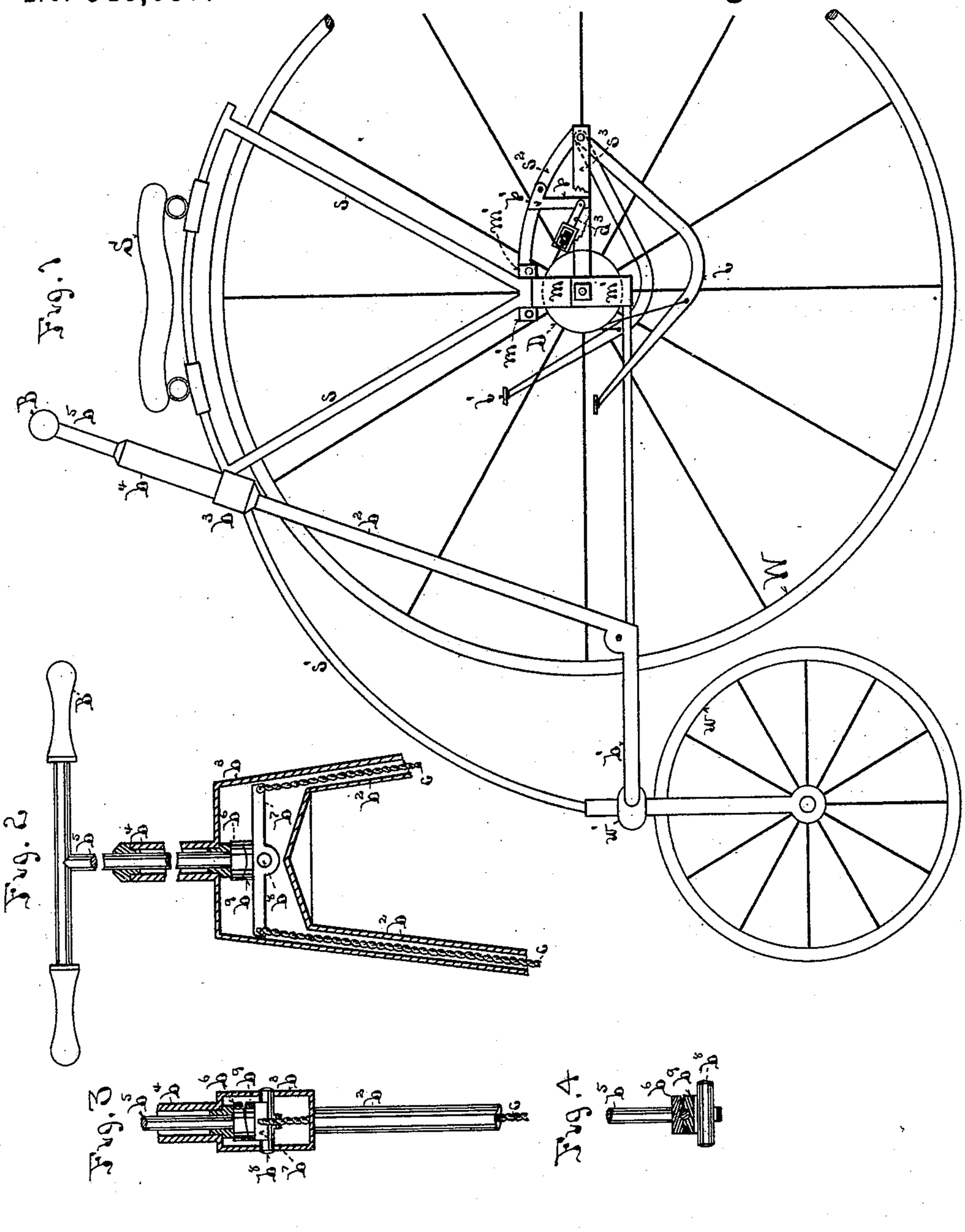

Fig. 1.

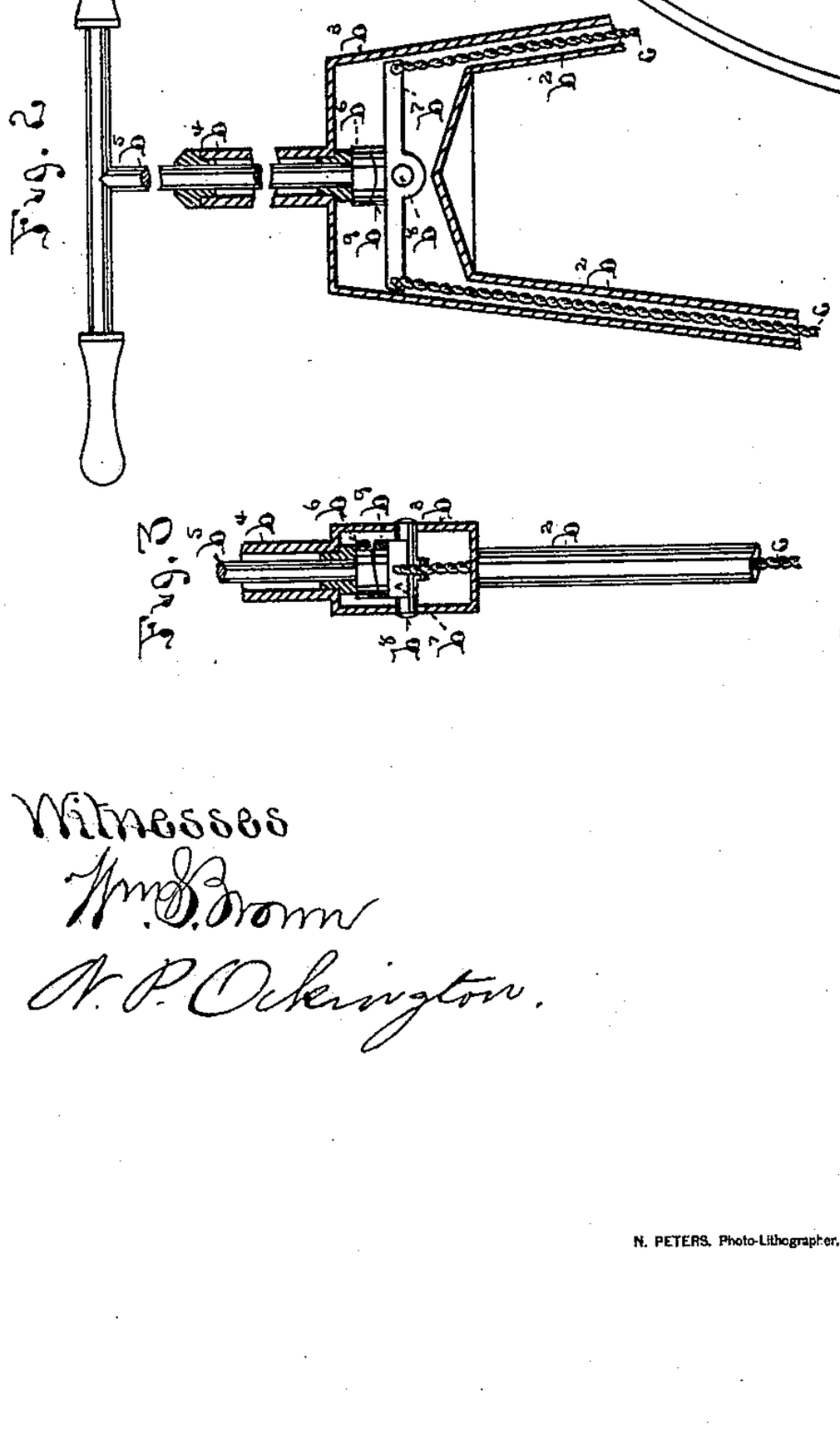

Fig. 2.

Fig. 3.

Fig. 4.

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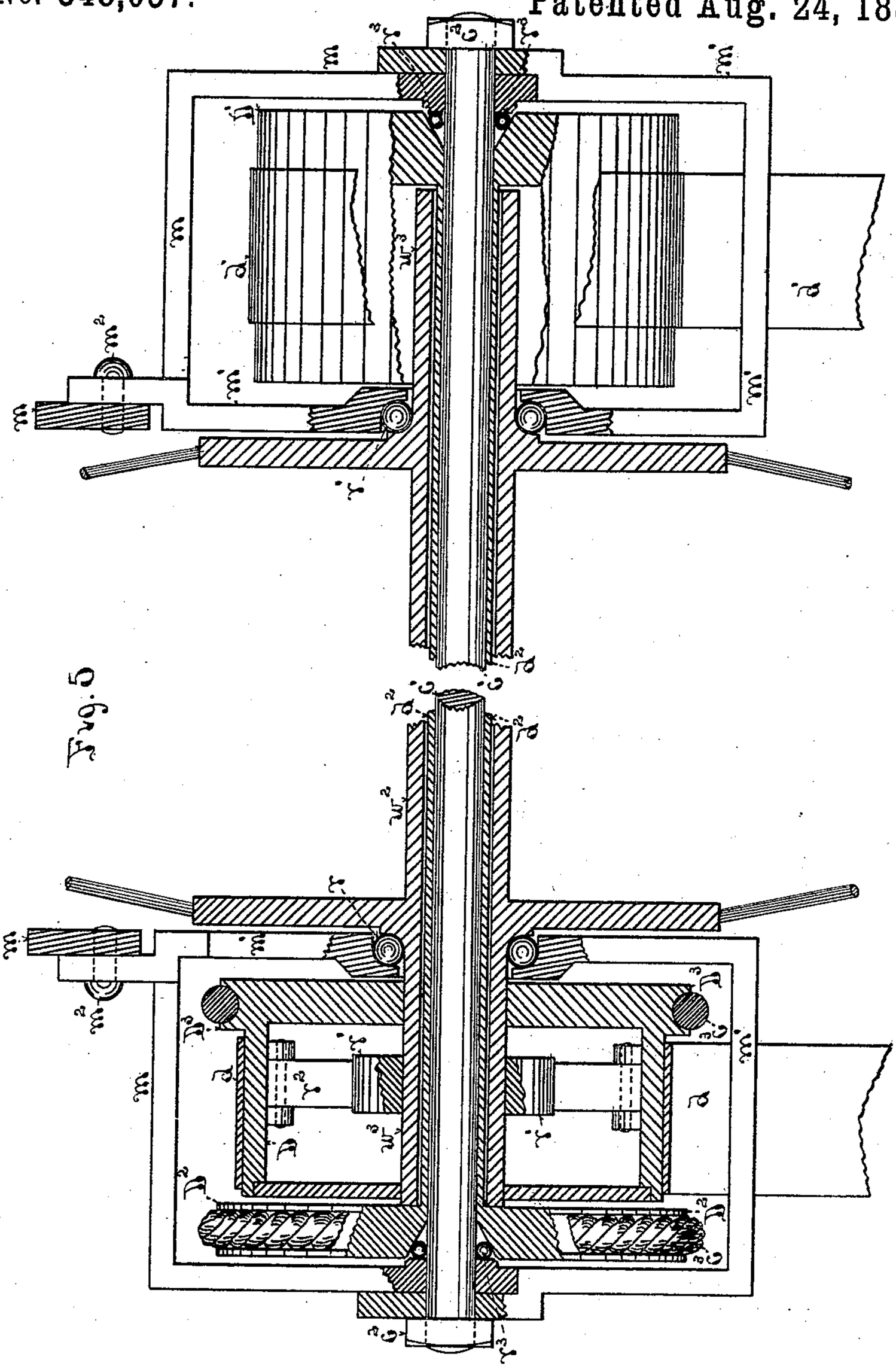

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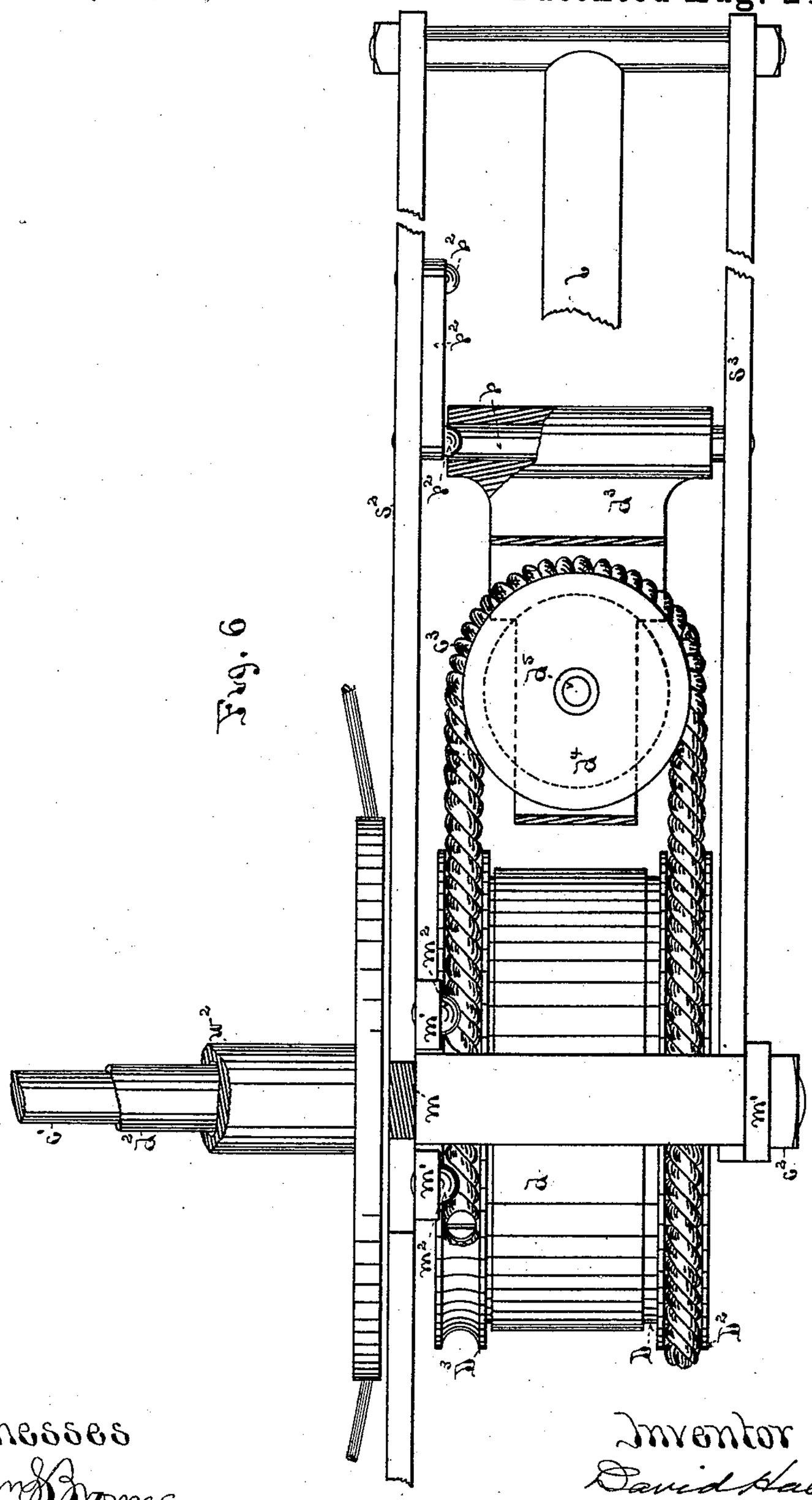
Fig. 6



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UNITED STATES PATENT OFFICE.

DAVID HALL RICE AND LEPINE H. RICE, OF BROOKLINE, MASSACHUSETTS.

VELOCIPEDE.

SPECIFICATION forming part of Letters Patent No. 348,057, dated August 24, 1886.

Application filed June 9, 1886. Serial No. 204,587. (No model.)

To all whom it may concern:

Be it known that we, DAVID HALL RICE and LEPINE H. RICE, of Brookline, in the county of Norfolk and State of Massachusetts, have invented a new and useful Improvement in Velocipedes, of which the following is a specification.

Our invention relates to velocipedes; and it consists in certain new and improved constructions and arrangements of the several parts thereof, substantially as hereinafter described and claimed.

In the drawings, Figure 1 is a side elevation of a velocipede provided with our improvements, and having a portion of the frame-work broken away to show the construction of particular parts. Fig. 2 is an enlarged rear view of a portion of the frame in section, with the steering-gear therein. Fig. 3 is a view of a portion of the same parts as Fig. 2, with the frame sectioned at right angles to that of Fig. 2. Fig. 4 is a portion of the steering-gear detached and in section. Fig. 5 is an enlarged vertical transverse section through a portion of the frame and driving-wheel in line with its axis, showing the construction of the connection between the driving-drums on opposite sides of the wheel. Fig. 6 is a top plan view of one of the driving-drums shown in Fig. 5, with the frame-work connected therein partly in section, to show the construction of certain parts.

W is the large or driving wheel of the velocipede, which is of the variety known as a "bicycle," and carries its small or steering wheel *w* ahead of the larger one. The saddle S is mounted over the main wheel, and is supported by the frame-work *s s* on each side of the machine, in the ordinary manner. The steering-wheel *w* is pivoted in the tubular socket *w'*, within which is fixed upon it a pulley or wheel. This socket is carried on the lower end of the curved brace *s'*, and out of it lead, on each side of the main wheel W, tubular braces *b' b'*, leading backward to the tubular braces b^2 b^2, which extend upward to the steering-handle, in the manner shown in the application of David Hall Rice for Letters Patent No. 183,638, filed November 23, 1885. Within the tubular braces *b' b²* a steering-cord is led downward from the steering-handle on one side around the pulley on the spindle of wheel *w*, and up on the opposite side through the corresponding tubular braces, as described in said former application. In the present instance we have connected this steering-cord at its upper ends to the steering-handle in an improved manner, which gives a very simple and powerful connection between the steering handle and cord. The tubular braces b^2 b^2 open into a hollow socket, b^3, at their upper ends, made widest transversely of the machine, and from the center of this rises the sleeve b^4, which carries the shaft b^5 of the steering-handle B. Shaft b^5 extends downward into hollow socket b^3, and has upon its lower end a disk, b^6, cam-shaped on its lower face, as shown, and shouldered on its upper face against a bushing in sleeve b^4. Immediately below disk b^6 a lever, b^7, is pivoted centrally on the horizontal pivot b^8, and extends transversely across in socket b^3, so that its ends come over tubes b^2 b^2. On top of lever b^7 is a disk, b^9, having its upper face beveled to fit against the lower face of disk b^6 for one half its surface, and the other half cut away parallel with pivot b^8, as shown, the beveled part of its surface being on the rear side of lever b^7. The ends of the cord *c*, which leads to the spindle of the steering-wheel, as before described, are made fast to the ends of lever b^7. It is evident that when the steering-handle B is turned one way or the other the cam-disk b^6, revolving with it, will press down upon the corresponding face of disk b^9, and depress one end of lever b^7 and raise the opposite end, thereby moving cord *c* one way or the other and turning the steering-wheel. To aid the disks b^6 b^9 in working smoothly upon each other, a ball is placed between them in cavities in them fitting its upper and lower hemispheres, and in line with the axis of disk b^6, as shown in Fig. 4. The driving-wheel W has its hub w^2 made tubular and provided with corresponding tubular extensions, w^3 w^3, on each end, Fig. 5. The frame on each side of the wheel is composed, as shown in the said former application, of two branches, *m m'*. The branch *m* is connected to the braces *s s* of the frame, and extends horizontally outward over and beyond the driving-drum D, and thence vertically downward to receive the fixed bolt *c'*, extending through the center of

the wheel through a hole in its lower end. The branch m' is bolted onto branch m at its upper end by two bolts, m^2 m^2, that end being forked or bifurcated for that purpose, and thence it extends vertically downward around the extensions w^3 of the wheel-hub and below the driving-drum D, whence it extends horizontally outward beneath the drum, and thence vertically upward outside of branch m, around the lower end of which it is shouldered, receiving through it the fixed bolt c', which thus serves to join the ends of the branches m m' together, while it is in turn supported by them.

By this arrangement the wheel W is supported outside of its hub-extensions in bearings in branches m' of the frame on each side, and the central bolt, c', is independently supported at each end outside the wheel-extensions in a fixed position, being secured in place by nuts c^2 c^2 at each end outside the frame screwed onto it. The vertical braces m' are grooved out around the extensions w^3 of the hub of the wheel W on their inner faces, to receive balls or rollers r r, and corresponding grooves are formed outside of the wheel-hub at each end around the extensions w^3 w^3, to receive the balls, thus forming ball or roller bearings, on which the wheel runs. By turning the nuts c^2 on bolt c' these bearings may be adjusted as desired. The extensions w^3 w^3 have around their outsides ratchet-teeth r', and the drums D D′ revolve around them, and are provided with pawls r^2, in the usual manner, to engage with the ratchet-teeth and drive the wheel W. These drums are connected by straps d d' with the levers l l', which are also of the ordinary construction and adapted to be moved downward by the feet of the rider to revolve the drums. In order to revolve the drums backward and wind up the straps upon them and raise the levers after each downward stroke, the springs ordinarily used for the purpose are dispensed with, and the following-described mechanism substituted therefor: The drum D′ overlaps and rests upon the extension w^3 of the wheel-hub on its side of the wheel W, and has its outer end revolving about the fixed bolt c' in a space left for the purpose within the inclosing branches m m' of the frames. Connected to this drum D′ is a tubular shaft, d^2, of slightly smaller outside diameter than the bore of the wheel-hub, which shaft extends through and beyond the latter and fits and revolves around the fixed bolt c'. On the opposite end of shaft d^2 from drum D′ is attached the grooved pulley-wheel D^2, so as to revolve with it. The tubular shaft d^2 and wheel D^2 are supported at their outer ends by balls r^3 r^3 in grooves, which bear upon bolt c' and relieve the friction. The drum D revolves around the extension w^3 of the wheel-hub on its side on which it bears, and has formed on its inside end and the other side of its actuating-strap d from pulley D^2 a grooved pulley attachment, D^3, corresponding with D^2. Between the backwardly-extending arms s^2 s^3 of the frame of the machine on that side a pivot, p, is attached to these arms, connecting them transversely, being attached to the upper arm, s^2, by an elbow-piece, p', secured to it by screws p^2 p^2, so as to bring it horizontal. On this pivot p is hinged a metal strap, d^3, so as to swing freely in a vertical direction, (see Figs. 1 and 6,) and this strap carries on its free end the pulley d^4, pivoted to it at d^5, its pivot being at right angles, or nearly so, with the axis of shaft d^2. The pulley d^4 is grooved to correspond with pulleys D^2 and D^3, and is of such a diameter at the bottom of its groove that the cord c^3 will lead from it freely on one side to D^2 and on the other to D^3. This cord is so wound onto these pulleys, after passing around d^4, that it goes around them in the opposite direction from that in which the straps d d' are wound upon the drums D D′, and so that when the strap d' is unwound from drum D′ by the depression of lever l' cord c^3 will be wound upon the pulley D^2, attached to that drum, and at the same time the strap d will be wound upon drum D, and the cord c^3 will be unwound from the pulley part D^3, attached to that drum. The parts being in this position, it is evident that the depression of lever l will unwind strap d from drum D and wind up cord c^3 on pulley D^3; but this unwinds cord c^3 from pulley D^2, which motion winds up strap d' on drum D′, ready for another stroke of the foot. The depression of lever l' in like manner reverses the movement of the parts and raises lever l. The pulley d^4, swinging upon its pivot p, automatically aligns itself with pulleys D^2 D^3, and works with very little friction, as the cord c^3 can be made of leather, and, being short, is not liable to stretch and become loose. From the compact arrangement of the parts they can also be cased in protecting them from dust and dirt. The same adjustment of the ball-bearings of the main wheel W by the nuts c^2 also serves to adjust the balls r^3 in the bearings of sleeve d^2, and washers of different thicknesses can be used around bolt c' against the balls for that purpose. From the arrangement of the parts the weight and friction of the main wheel W are taken entirely off of shaft d^2, which is important to its freedom of action, and but little force is required to raise the levers ready for the return-stroke.

In putting the machine together the arrangement of the frame serves a useful purpose. The parts m' m' are first slipped over the extensions w^3 w^3 of the wheel-hub, with the balls r in place, and the inner part of the drum D put on. The ratchet-teeth are then keyed onto extensions w^3 w^3. The outer face of drum D is bolted on, and the drum D′ and its tubular shaft d^2 are slipped into place from the opposite side of the wheel, and the pulley D^2 driven or keyed onto the free end of the shaft. The branches m' m' are then bolted in place in the frame, and the balls r^3 r^3 are inserted and the bolt c' passed through the center of the whole, and the nuts c^2 set up to adjust the bearings. To facilitate this operation the drum D′ is made to open on its inner face,

instead of on its outer face, like drum D; but its outer face-plate may be attached to shaft d^2, in which case it will open on the outer face, like drum D.

Instead of making the tubular shaft d^2 to revolve about the fixed bolt c', with drum D′ and pulley D^2 upon its ends, it may be made in one piece with the bolt c' and allowed to revolve in the frame and accomplish substantially the same connection between the drums D and D′ without departing from the spirit of our invention; but we prefer the construction first described, as giving greater stability to the frame. It is also evident that the parts of the frame branches m and m', which inclose the drums D D′ on the outside, and the bolt c' might be entirely dispensed with, and the tubular shaft d^2 made to take a running bearing inside of the tubular hub of wheel W, and our connection between the drums D D′ be preserved and operate substantially as before. It is further evident that our connection between drums D D′ may be preserved if the balls $r\,r$ be removed from about the hub of wheel W, and the latter allowed to take its bearing upon the outside of the tubular shaft d^2, instead of in branches m' of the frame.

What we claim as new and of our invention is—

1. The combination of wheel W, having a tubular hub, the clutch driving-drums D D′, connected to the same and having their bearings thereon on each side, the shaft d^2, attached to drum D′, extending through the wheel-hub beyond its opposite side, and connecting mechanism between said shaft d^2 and drum D, adapted to reverse the movement of such drum from the shaft, and vice versa, substantially as described.

2. The combination of wheel W, having a tubular hub, the clutch driving-drums D D′, connected to the same on each side, the shaft d^2, connected to drum D′ and extending through the wheel-hub beyond its opposite side, provided with pulley D^2, the pulley d^4, attached to the frame, the pulley part D^3, attached to drum D, and the connecting-cord c^3, substantially as described.

3. The combination of wheel W, having a tubular hub, the clutch driving-drums D D′, connected to the same on each side, the tubular shaft d^2, attached to drum D′ and extending through the wheel-hub beyond its opposite side, the bolt c', connecting the opposite sides of the frame through the tubular shaft, and connecting mechanism between said tubular shaft and drum D, adapted to reverse the movement of the latter from the shaft, and vice versa, substantially as described.

4. The combination of wheel W, having a tubular hub, the clutch driving-drums D D′, connected to the same on each side, the tubular shaft d^2, attached to drum D′, extending through the wheel-hub beyond its opposite side, and provided with ball-bearings r^3 r^3 at each end, the bolt c', connecting the opposite sides of the frame through the tubular shaft, and connecting mechanism between said tubular shaft and drum D, adapted to reverse the movement of the latter from the shaft, and vice versa, substantially as described.

5. The combination of wheel W, having a tubular hub, the driving clutch-drum D′, connected to the same on one side, the shaft d^2, connected to said drum, extending through said wheel-hub beyond its opposite end and having pulley D^2 connected thereto, the driving clutch-drum D, connected to the wheel-hub on that side by clutch mechanism, the pulley d^4, attached to the frame by an axis substantially vertical to shaft d^2, and cord c^3, passing around pulley d^4, and the driving-strap d, attached to pulley D^2 and drum D, substantially as described.

6. The combination of wheel W, having a tubular hub, the driving clutch-drum D′, connected to the same on one side, the shaft d^2, connected to said drum, extending through said wheel-hub beyond its opposite end, and carrying pulley D^2, the driving clutch-drum D, connected to the wheel-hub on that side by clutch mechanism, the pulley d^4, revolving in a plane substantially at right angles to the plane of revolution of drum D and swinging upon pivot p, attached to the frame, and cord c^3, passing around pulley d^4, connecting pulley D^2 and drum D, substantially as described.

7. The combination of wheel W, having a tubular hub, the clutch driving-drums D D′, connected to the same on each side, the frame provided with branches m' m', passing down between the drums and wheel W on each side, supported upon the wheel-hub on bearings, and also provided with branches m m, extending outwardly around the axis of the drums, and the bolt c', connecting the ends of branches m m through the tubular wheel-hub, substantially as described.

8. The combination of wheel W, having a tubular hub, the clutch driving-drums D D′, connected to the same on each side, the frame provided with branches m' m', passing down between the drums and wheel W, supported upon the wheel-hub on bearings fitted with rollers r r, and also provided with branches m m, extending outward around the axis of the drums, and the bolt c', connecting the ends of branches m m on opposite sides of the wheel through the tubular wheel-hub, and provided with a nut, c^2, on its outer end, substantially as described.

9. The combination of wheel W, having a tubular hub, the clutch driving-drums D D′ connected therewith, the frame branches m m, inclosing the drums on each side of the wheel and supported on the wheel-hub by bearings in the branches m' m' inside the drums, and the bolt c, connecting the opposite sides of the frame through the tubular wheel-hub, substantially as described.

10. In combination with the steering-cord c, connected with and adapted to turn steering-wheel w, the pivoted lever b^7, provided with beveled plate b^9, and the steering-shaft b^5, pro-

vided with the corresponding beveled plate, b^6, and journaled vertically in the frame-work, substantially as described.

11. The single-drum propelling mechanism on each side of the driving wheel of a vehicle, with a shaft-connection through the hub of said wheel attached to the propelling-drum on one side directly and to the propelling-drum on the other side by a cord and pulley or similar mechanism, whereby the rotation of either propelling-drum, in driving the wheel forward, will communicate a reverse rotation to the opposite propelling-drum, substantially as described.

12. The combination of wheel W, having a tubular hub and sustaining the weight of the frame in bearings outside of the same, the clutch driving-drums D D′, revolving upon and connected to said hub on each side by clutch mechanism, and the shaft d^2, connected with one of said drums directly and supported within said tubular wheel-hub on bearings independent thereof, and connected to the other of said drums by mechanism reversing the direction of rotation thereof in the drum, substantially as described.

13. The combination of the wheel W, having a tubular hub with extensions w^3 w^3 on each end, the clutch driving-drums D D′, fitting over and connected to said extensions, the bolt c', connecting the opposite sides of the frame through the tubular wheel-hub, and the frame constructed in two branches, m m', surrounding the drums on each side, the inner branches, m', being attached by bolts to the outer ones, m, and supported on the exterior of extensions w^3 w^3 by bearings, substantially described.

14. The drum-propelling mechanism on each side of the driving-wheel of a vehicle, with a shaft-connection through the hub of said wheel, supported upon bearings in the branches m m of the frame at each end of the same, such shaft-connection being attached to and moving with the propelling-drum outside the wheel-hub on one side the wheel, and being attached to the propelling-drum outside the wheel-hub on the other side of the wheel by mechanism reversing the motion of said shaft-connection in such drum, all of said connections between said shaft and said drums being within the said branches m m of the frame, substantially as described.

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