No. 619,637. Patented Feb. 14, 1899.

B. TUCKER.

VEHICLE PROPELLING MECHANISM.

(Application filed Aug. 24, 1896.)

(No Model.) 2 Sheets—Sheet 1.

Fig. 1

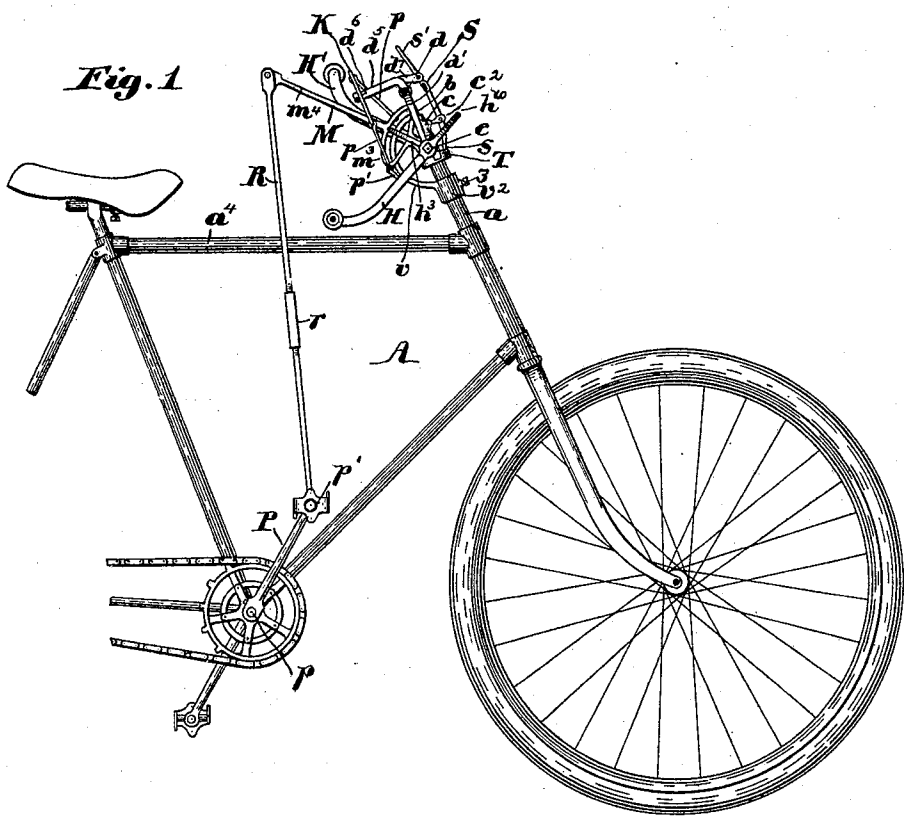
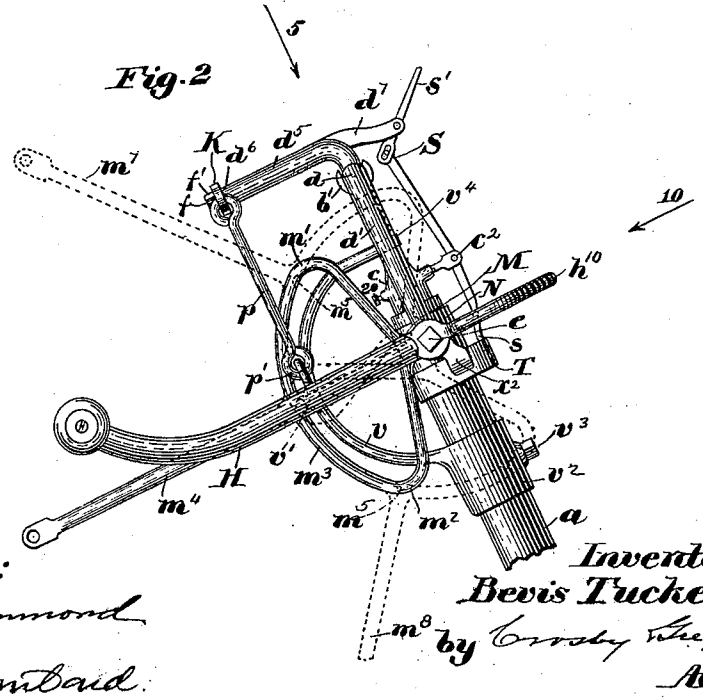


Fig. 2



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Fig. 3.

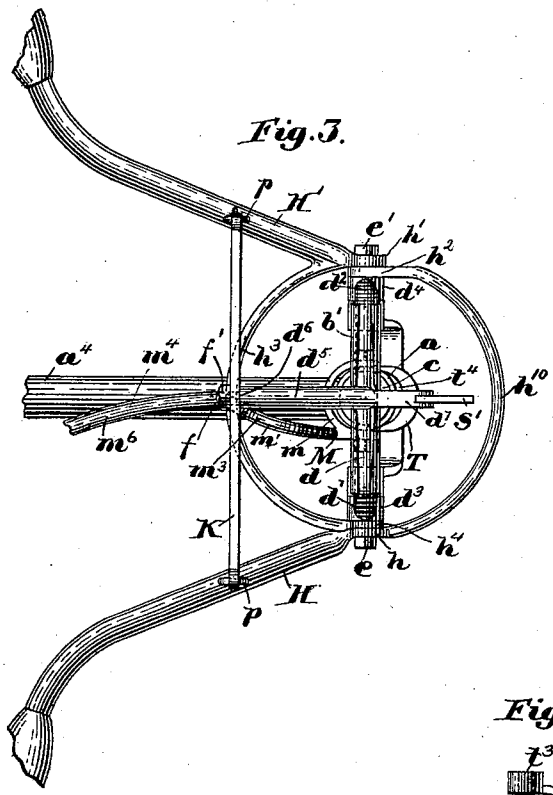


Fig. 4.

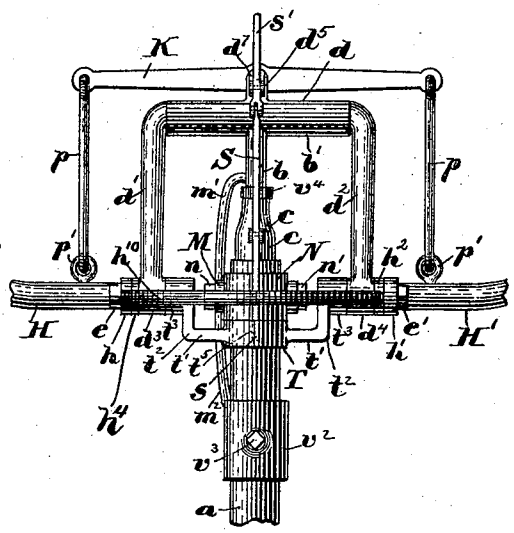
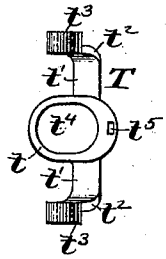


Fig. 5.



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VEHICLE-PROPELLING MECHANISM.

SPECIFICATION forming part of Letters Patent No. 619,637, dated February 14, 1899.

Application filed August 24, 1896. Serial No. 603,694. (No model.)

To all whom it may concern:

Be it known that I, BEVIS TUCKER, of Chelsea, in the county of Suffolk and State of Massachusetts, have invented an Improvement in Vehicle-Propelling Mechanism, of which the following description, in connection with the accompanying drawings, is a specification, like letters and figures on the drawings representing like parts.

The object of this invention is to provide improved means whereby the power of the arms may be utilized for the propulsion of a vehicle, and it is more particularly my aim to furnish bicycles with an auxiliary propelling apparatus so constructed that the power may be applied at a moment when the freedom of movement of the rider's legs will be in no wise hindered thereby, but, on the contrary, their leverage will be improved.

The various features of my invention will be fully described and illustrated in the accompanying specification and drawings and set forth in the claims.

In the accompanying drawings, Figure 1 is a view in side elevation of a bicycle provided with mechanism embodying my invention. Fig. 2 is a similar enlarged view of said mechanism. Fig. 3 is a plan view of the same, looking in the direction of the arrow 5, Fig. 2; and Fig. 4 is a front elevation looking in the direction of the arrow 10, Fig. 2, Fig. 5 being a detail to be referred to hereinafter.

In the preferred embodiment of my invention illustrated in the drawings, and to which reference will be had hereinafter, A is a bicycle of usual or desired construction, the head *a* of which may and preferably does extend for a considerable distance above the frame proper as a tubular support. In place of the usual handle-bar construction, however, I have shown a post *b*, adapted to be held by the set-screw 20 (see Fig. 2) in adjusted position within and carried by the steering-head *c* and provided at its upper end with an elongated bearing *b'*, located transversely with respect to the plane of the front wheel, this constituting with the following-described construction the preferred form of support for the handle-bars when the latter are to be arranged in such a manner that their operativeness will be at all times under the control of the rider.

Loosely mounted in the bearing *b'* is supported a yoke-like structure comprising a rock-shaft *d*, which lies in the bearing, with depending arms d' d^2, in the free ends of which latter are respectively formed bearings d^3 d^4 to carry the handle-bars H H', pivotally mounted thereon by means of bolts *e e'*, thrust through suitable bearing portions *h h'* in the respective bars. The handle-bar H is preferably extended forward beyond the portion h^{10}, bent around, as at *h'*, and to add to its rigidity furnished with another bearing h^2, which receives and is carried by the bolt *e'* adjacent the bearing *h'* of the bar H'. The bar H' also is provided with a similar extension h^3 and auxiliary bearing h^4, and its middle portion is curved, for a purpose to be set forth later, in the arc of a circle, the center whereof is the point of intersection between the plane of the bicycle-frame and the center line of the bolts *e e'*, the extension or sector h^3 being formed at an angle to instead of in continuation of the handle H' and being located to the rear of the steering-head and rotatable about a horizontal axis coinciding with a chord of the circle of which it is a sector.

The handle-bars I prefer to provide as auxiliary and convenient means to operate an actuating-lever, to support which latter I have shown in this instance on the shaft *d* and bent rearwardly at right angles thereto an arm d^5, to the free end d^6 of which is pivotally mounted the actuating-lever K, secured to the arm by a threaded lug *f* and nut *f'* and free to swing in a substantially vertical plane transversely to the frame, the ends of the lever being respectively connected loosely to the sector through the handle-bars, preferably by links *p p* and eyes *p' p'*, by means of which the motion of one handle-bar is communicated to the other, H being depressed during the elevation of H', and vice versa.

It will be obvious that by grasping and operating the arms of the actuating-lever it may be utilized independently of separate handle-bars to actuate the mechanism, and such a use is contemplated by my invention, though I have not considered it necessary to show handles thereon in the instance illustrated.

As means for converting the power developed by the operation of the reciprocating handle-bars illustrated into movement of the vehicle I have shown an oscillating lever M,

adapted to be engaged and operated by the sector h^3 and connected by a rod or pitman R to the crank P. A fulcrum for this lever M is provided in the screw-pin n, (see Fig. 4,) mounted, preferably, for convenience on a collar N, adjustable on the head-tube a, and to insure rigidity I have indicated the end of the lever as forked at m to allow the provision of a similar bearing on the screw-pin n' on the opposite side of the collar, which latter may be secured in adjusted position by tightening the screw-pins n and n' up against the head-tube a within the collar. From the fork the lever M is vertically branched to form loops m' m^2, the outer members of which together preferably form a sector m^3, concentric with the sector h^3, but substantially perpendicular thereto and preferably offset, so that the inner end of the lateral continuation or shank m^4 of the lever virtually lies in the medial longitudinal plane of the bicycle-frame.

Opposite its connection with the shank m^4 the sector m^3 is provided with a notch m^5, best seen in the dotted-line positions of the lever M, (see Fig. 2,) adapted to receive and be engaged by the outer surface of the horizontal actuating-sector h^3, so that during reciprocation of the handle-bars the lever will be oscillated about its pivots n n' and will in turn, through the medium of the pitman R and crank P, transmit its motion to the driving-shaft p and thence by usual connections to the rear wheel. (Not shown.) It is obvious that by reversing the direction of the lever M and extending it forward from the head-tube it may be actuated by the sector h^{10} of the handle-bar H.

As indicated in Fig. 3, the shank m^4 of the lever M is slightly offset, as at m^6, to allow the pitman to clear the cross-bar a^4 of the bicycle-frame; but obviously this offset could be replaced by one in the pitman itself, and while the pitman should be rigid to insure the best results I do not limit myself to the particular design shown nor to the location of the oscillating lever and pitman behind the head-tube.

In Fig. 2 I have indicated by dotted lines the extreme upper and lower positions m^7 and m^8 of the shank m^4, and in this figure and the succeeding ones I have illustrated the handle-bars as locked about midway of their range of movement, also showing one form of means whereby this may be effected and the sectors h^3 and m^3 thrown out of operative engagement. The means shown in the drawings consists of a compound lever S, mounted in forked arms c^2 d', with which the steering-head c and yoke d are respectively provided, and a cross-head T, having a recess t^5, into which takes the end s of the lever S. This cross-head (best shown in Figs. 4 and 5) is composed of an apertured body portion t, from which extend lateral arms t' t', bent upwardly at t^2 t^2 and having at their free ends bearings t^3 t^3.

The aperture t^4, which is adapted to receive the head-tube a, is slightly elongated to permit longitudinal play, and the upper surface of the body portion preferably bears against the lower surface of the collar N, while the arm-bearings t^3 t^3 are adapted to receive, respectively, the inner ends of the bolts e e', the cross-head serving at once the purpose of a brace for the handle-bar bearings and a medium for transmitting the motion of the compound lever S to the yoke d to oscillate the depending arms d' d^2 and throw the actuating-sector h^3 back into operative position in the notch m^5 of the actuated sector m^3 or forward into inoperative position in engagement with a notch v' in a sector-like brace v, adjustably secured at its lower end to the head-tube a, as by a collar v^2 and set-screw v^3, and at its upper end pierced at v^4 to permit the passage therethrough of the post b, by which it is supported.

It will readily be seen that either the cross-head T or the yoke d would of itself be sufficient to afford a bearing for the handle-bars, and if it is preferred the feature of oscillation may be dispensed with without material alteration in the instrumentalities I have chosen wherewith to illustrate an embodiment of my invention; but if either cross-head or yoke should be omitted the remaining bearing member should be arranged to support the handle-bars firmly.

It will be seen from the foregoing description that in my preferred construction the propelling mechanism may be adjusted on its support at the desire of the operator and secured by the various set-screws in such position as will insure the greatest convenience and efficiency, and to the same end adjustment of the pitman may be provided for by the use of a screw-coupling r or otherwise.

In operation the handle-bar H is at its lowest point when the corresponding pedal p^2 is at its highest point, (see Fig. 1,) and so with the other handle-bar and pedal, so that the rider is enabled to more conveniently deliver a powerful downward thrust on the pedal than in the absence of the auxiliary mechanism, while, conversely, the lift on the handle-bar is rendered more effective by the accompanying down thrust on the pedal on that side.

The transmission of power from one of the handle-bars to the oscillating lever only through the other handle-bar while the bars are reciprocating oppositely I have shown as accomplished by the use of a rock-lever K and links p p; but my invention contemplates connecting the bars or the parts carried thereon by any means independent of the operating connections to the propelling-shaft.

The auxiliary mechanism is adapted to serve as an aid in retarding as well as in accelerating the motion of the vehicle to which it is applied, or, if desired, it may by pushing forward the handle member s' of the compound lever S be thrown into inoperative position during motion of the vehicle, leaving the lever M free to oscillate, and in mounting the operator will find it convenient to allow

the handle-bars to remain locked until he is in the saddle and under way, when reversal of the handle s' will throw the sectors into contact.

I wish it understood that I do not limit myself to the exact means illustrated for throwing the actuating-sector into and out of operative position, for the same may be varied considerably or dispensed with entirely without departing from the spirit of my invention; nor do I limit myself to the exact details of the other parts of the mechanism herein shown and described; but,

Having thus fully set forth my invention, what I claim, and desire to secure protection on, is—

1. In a bicycle or the like, a frame; a shaft and an oscillating lever carried thereby and operatively connected one with the other; handle-bars pivotally mounted on said frame and free to rotate about a horizontal axis, one of said handle-bars having a sector-like actuating member rotatable therewith about said axis and arranged to engage and coöperate with said oscillating lever, thereby to actuate said shaft, and connections intermediate the sector-carrying handle-bar and the other handle-bar to permit the latter to actuate the sector through the former and to insure opposite reciprocation of said handle-bars, substantially as described.

2. Vehicle-propelling mechanism, comprising a driving-shaft, reciprocating handle-bars; connections intermediate one of said handle-bars and said shaft to permit the former to actuate the latter; said connections including an oscillating lever, and a sector rotated with and by said handle-bar about a horizontal axis and adapted to engage and actuate said oscillating lever; and means to permit the handle-bar so connected to be actuated in either direction by opposite reciprocation of the other handle-bar thereby to enable the motion of the latter to be communicated to the shaft, substantially as described.

3. In a bicycle or the like, the frame and steering-head, a rotatable shaft and an oscillating lever both carried by the frame, and actuating mechanism comprising handle-bars pivotally mounted on the steering-head and connected to reciprocate oppositely, one of said bars being provided with an actuating-sector adapted to engage and oscillate said lever, and means permanently attached to, and organized with, said actuating mechanism and under the control of the rider while riding to throw said sector into and out of engagement with said lever, substantially as described.

4. In a bicycle or the like, the frame and steering-head, a rotatable crank-shaft and an oscillating lever both carried by the frame, the lever being adjustably mounted directly thereon, a post adjustably secured within and carried by the steering-head, handle-bars carried by said post and free to move about a horizontal axis, one of said bars being provided with a sector adapted to engage and oscillate said lever, and connections intermediate said bars to compel opposite reciprocation of the same to each other and to the cranks respectively on the same side of the frame, means directly connecting said lever and crank-shaft to permit rotation of the shaft by the lever, substantially as described.

5. In a bicycle or the like, the frame including a tubular support, the steering-head, a rotatable shaft carried by said frame and a lever pivotally mounted on the support, a yoke loosely mounted on the steering-head, handle-bars mounted pivotally on said yoke free to move about a horizontal axis and adapted to engage and operate the oscillating lever, connections intermediate said lever and shaft to permit the former to rotate the latter, and manually-operated means to move the yoke, to throw the handle-bars into one their operative position, and into another their inoperative position, substantially as described.

6. In a bicycle or other vehicle, the frame including a head and steering-head, a yoke rotatable with said steering-head and having its arms free to oscillate with respect thereto, vehicle-propelling mechanism comprising handle-bars mounted on the free portion of said yoke and controlled as to operation by the position of said yoke; a cross-head to brace said free portion; and a manually-operated lever adjacent said steering-head to engage and move said cross-head to oscillate the yoke, substantially as described.

7. In an apparatus of the class described, a post having a transverse bearing, a yoke composed of a rock-shaft supported and free to oscillate in said bearing and arms depending from said shaft, said arms being provided at their free ends with bearings to receive actuating apparatus adapted to be thrown into one, its operative, and another, its inoperative position, by oscillation of the yoke, and means to control and effect said oscillation, substantially as described.

8. In a bicycle or the like, the frame, its propelling-shaft and steering-head; a yoke mounted on or adjacent the steering-head and movable therewith; handle-bars pivotally mounted on said yoke and operatively connected with said shaft; said connections including an actuating-sector rotatable about an axis coinciding with the axis of said handle-bars; one of said handle-bars being constructed and arranged to directly actuate said actuating-sector, and the other to deliver its power through the directly-actuating handle-bar, while reciprocating oppositely thereto, substantially as described.

9. In a bicycle or the like, the driving-shaft and steering-post; a bearing-piece or cross-head carried by said post and adapted to be oscillated across the longitudinal axis of the post; means to support said cross-head in position; handle-bars mounted on and free to swing about a horizontal axis passing through

said bearing-piece; actuating devices operated by the handle-bars and arranged to be operative in one position of the bearing-piece and inoperative in another position thereof; mechanism adapted to be engaged by said actuating devices when the latter are in operative position to transmit the motion of the handle-bars to the driving-shaft, and means to oscillate the bearing-piece to throw the actuating devices into and out of engagement with said mechanism, substantially as described.

10. Vehicle-propelling mechanism, comprising a driving-wheel, handle-bars mounted to reciprocate oppositely about a horizontal axis, said bars being arranged respectively to cause oscillation of an actuating-sector mounted to rotate about its chordal axis; an oscillating lever adapted to be engaged and actuated by rotation of said sector; and operating connections between said lever and said driving-wheel.

11. In a bicycle; a frame provided with a propelling-shaft; a steering-head for said frame, movable with respect to said shaft; an actuating-sector concentric with the longitudinal axis of said steering-head and mounted to oscillate about its chordal axis upon a support rotatable with said steering-head; an actuating-lever mounted transversely with respect to said frame and rotatable about an axis parallel with said frame; means to transmit the motion of said actuating-lever to said sector to cause the latter to oscillate, and means to transmit the motion of said sector to, and convert it into rotation of said propelling-shaft, said transmitting means in each instance being adapted to operate regardless of the rotative or oscillating position of said sector, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

BEVIS TUCKER.

Witnesses:
ALEX. C. PROUDFIT,
FREDERICK L. EMERY.