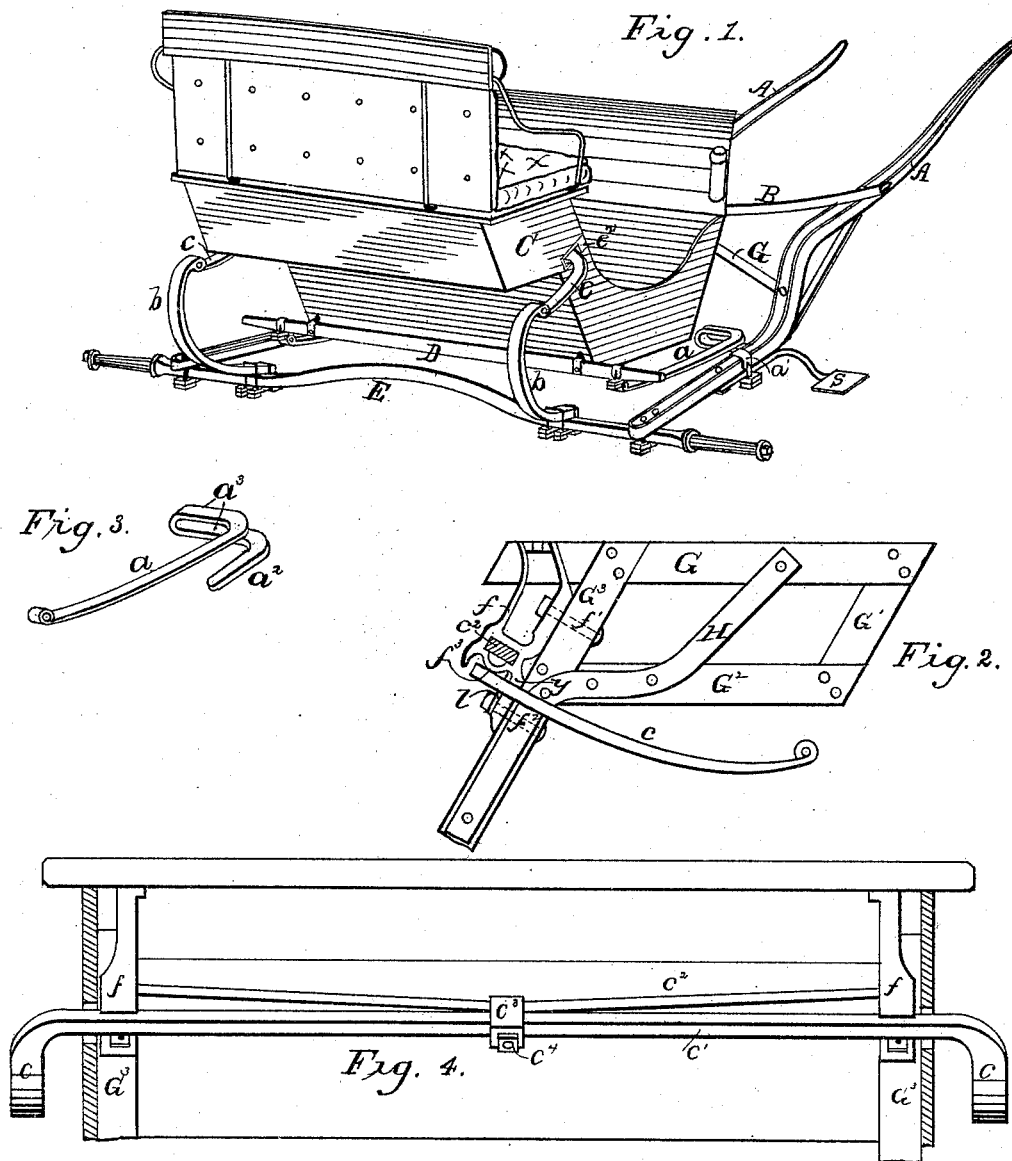


E. F. MORSE.
TWO WHEELED VEHICLE.

No. 492,223.

Patented Feb. 21, 1893.



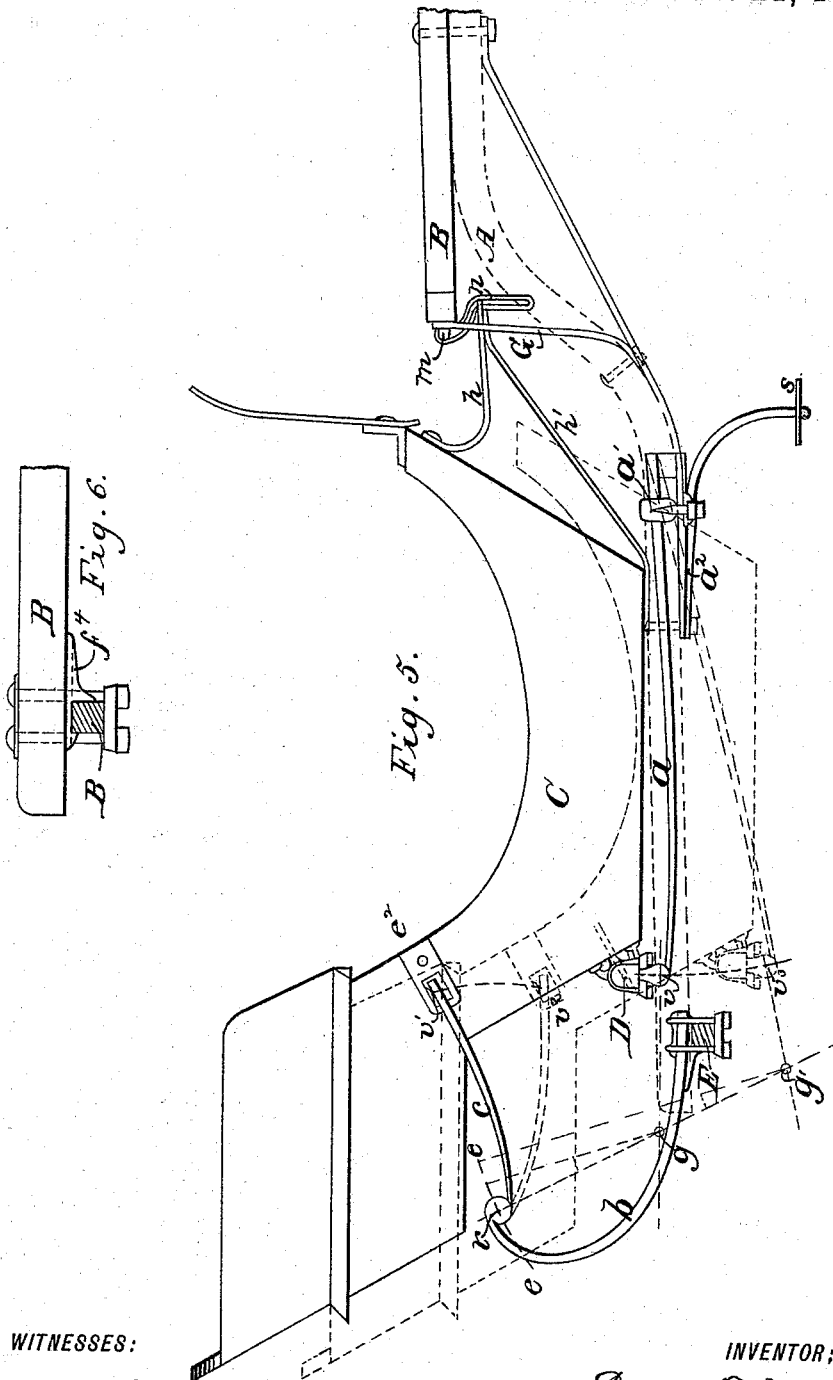
WITNESSES:
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Frank L. Morse

INVENTOR;
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UNITED STATES PATENT OFFICE.

EVERETT F. MORSE, OF TRUMANSBURG, NEW YORK.

TWO-WHEELED VEHICLE.

SPECIFICATION forming part of Letters Patent No. 492,223, dated February 21, 1893.

Application filed December 13, 1890. Renewed February 24, 1892. Serial No. 422,794. (No model.)

To all whom it may concern:

Be it known that I, EVERETT F. MORSE, a citizen of the United States, residing at Trumansburg, in the county of Tompkins and State of New York, have invented certain new and useful Improvements in Two-Wheeled Vehicles, of which the following is a specification.

The objects of my invention are to provide an elastic connection between the body and gear which will permit an up and down vibratory motion of the thills independently of the body, and form a yielding resistance to same that will increase in intensity with the depression of the body and load in the vehicle, and, also to provide springs of simple and novel construction which will yield an easy and even vertical motion to the body and act to equalize the depressions of its opposite sides.

In the accompanying drawings illustrating my invention, Figure 1, is a perspective view of my vehicle. Fig. 2, is a side view of the upper part of the framework of the body showing the manner of bracing the same and the manner of supporting the torsion springs within the body. Fig. 3, is a perspective view of one of my lower springs. Fig. 4, is a front view of the part of the body below the seat, showing the arrangement of my torsion springs. Fig. 5, is a side elevation of my vehicle showing the front thill in dotted lines so as not to hide parts back of it and illustrating the body in its normal and depressed positions, showing the principle upon which the springs resist the body's rocking with greater force when depressed than when in its normal position. Fig. 6, is a detached view of the manner of connecting the thills to the axle.

Similar letters refer to similar parts throughout the several views.

In two wheeled vehicles heretofore constructed, freedom from horse motion has been sought by providing an elastic connection between the body and the gear, which, while permitting the thills to vibrate relatively to the body, does not provide a resistance to this motion which increases with the load in the vehicle. In all of these will be found one or the other of two serious objections, viz. the resistance to the vibratory motion of the thills

will be either too great to avoid communicating it to the body when lightly loaded, or too small to give the body stability when heavily loaded, for a resistance small enough to prevent the former, is too small to effect the latter. Both these objections are entirely avoided by the improvements embodied in my invention which utilize the depression of the body due to the yielding of the supporting springs to increase the resistance to this vibratory motion of the thills as the load in the body is increased, so as to provide the proper degree of stiffness to give the greatest stability possible with absolute freedom from horse motion, for every load.

Referring to the drawings, A A, are the thills, E, the axle securely attached to the thills, B, the cross-bar connecting the thills, G a brace connecting the thills and securely attached to the back side of the middle part of cross-bar B; C, the body supported by the springs *a* and *c*. *b b*, are springs rigidly attached to the axle, which extend backward and upward and support, at their free ends, the ends of arms *c c*, by a pivotal connection.

Spring *a*, a detached view of which is shown in Fig. 3, consists of arm *a*², which is rigidly attached to the lower side of the thill, the two substantially parallel torsion branches *a*³ *a*³, extending transversely of the vehicle, and arm *a*, extending backward at the side of the body and having its end pivotally connected to bar D, which is rigidly attached to the lower part of the body and which may be considered as a part of the same. A similar spring is provided for the other side of the vehicle and these two constitute the lower springs. The upper springs consist of a torsional rod *c*², (Fig. 4) extending across the body under the seat, and a torsional rod *c*¹, arranged directly below the former and securely clamped to the middle of the same by clamp *c*³. Torsion bar *c*¹, extends through the body and is then bent backward at right angles to its middle portion, thus forming the arms *c c*, having eyes at their ends adapted to be pivotally connected to the ends of springs *b b*. The upper spring is secured to the body by the spring hangers *f*, a side view of which is shown in Fig. 2. These hangers are securely bolted to the framework by bolts *f*¹ *f*², and are provided with suitably shaped sockets to receive the ends of torsion

bar c^2 , and thus restrain them from turning. Directly below the socket the hanger is provided with a curved surface f^3 , against which the spring bar c' , rests and turns as the springs
 5 are worked. A small piece of leather i , is secured by bolt f^2 , to the front side of arm y , extending downward from the hanger f , and serves as an anti-squeaking surface for the bar c' , to rest against. Metallic escutcheons
 10 e^2 form a neat protection to the sides of the body where the springs pass through them.

The upper and lower springs, in supporting the body and its load, are subjected to twisting strains throughout their torsional
 15 branches which, in yielding, permit the arms a , and c , to turn about their respective torsional branches and the body to drop as shown by the dotted lines. The body is held in a horizontal position by virtue of the arms a and c
 20 being arranged one above the other and restraining the parts of the body to which they are attached to follow the substantially parallel curved paths $v'-v^2$ and $v-v^3$ (Fig. 5). These parts being restrained to the former
 25 path by the elastic force of spring b , and to the latter path by the positive action of arm a . Thus the springs in yielding, provide the body with a very smooth and even up and down motion to compensate for rough roads.

30 The body C , is fulcrumed or hinged about an axis substantially parallel to and near the axle by hinges v , one part of which is rigidly connected to the body and the other part to the gear by arms a . These arms permit the
 35 hinges to move up and down relatively to the gear by their angular motion. Arm b , is rigidly attached to the gear and extends to a point either directly or obliquely above the axis of hinge v . The stiffness of this arm is
 40 such that it will be depressed less than hinge v , as the body is loaded. The body is connected with arms b , by arms c , the angular motion of which allows the body to be depressed relatively to the end r , of arm b .

45 The peculiar operation of the springs in resisting the endwise tipping of the body with greater force when the body is depressed than when in its normal condition is as follows:— When the body is tipped forward and back-
 50 ward, while the thills remain stationary, the eye r , will follow the path $e-e$, while the spring b , yields to this movement of the body. At the same time there will be a smaller movement of the eye v , along the path $v-v^3$. The
 55 axis of this rocking motion when the body is in any of its positions, is at the intersections of the lines drawn perpendicular to these paths and through the eyes r , and v . Thus, when the body is in its normal position
 60 the axis of rocking is at g , where the perpendicular lines $v-g$, and $r-g$, intersect, but when the body is depressed to the position shown by the dotted lines, the axis of rocking is at g' where the perpendicular lines $r-g'$,
 65 and v^3-g' , intersect. The action of arm a , is thus to carry the axis of rocking down as the

body is depressed. The springs b , being very stiff as compared with springs a , provide nearly all the resistance to the body's tipping
 70 endwise and are depressed very little under the greatest load so that the eyes r , remain in substantially the same position. When the body is in its normal position, the yielding resistance of springs b , acts to restrain the
 75 body from tipping with the lever arm $r-g$, but when the body is depressed it acts with the much greater lever arm $r-g'$. Thus the depression of the body due to a heavy load causes the springs to act with greater leverage to restrain the body from tipping endwise. 80

By making arms a , and c , to form a part of the supporting springs, the vehicle is much simplified, but it is apparent that the action
 85 of the arms thus arranged, in providing an increased resistance to the body's tipping as it is depressed, would be substantially the same were the body supported by any of the ordinary springs. Of course under the latter
 90 conditions the arms a , and c , could be pivotally connected at both ends.

It is not essential that the arms b , c and a , shall extend longitudinally of the vehicle to attain a variable resistance to the endwise
 95 rocking of the body which will increase as the body is depressed through the increased leverage described, as either or all of these arms may extend transversely of the vehicle and attain similar results.

I claim under separate application, Serial No. 422,686 of even date somewhat similar
 100 springs as applied to four wheeled vehicles, to which reference may be made.

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

1. In a two wheeled vehicle, the combination with the axle and thills securely attached
 105 thereto, of a body having the axis about which it is adapted to rock endwise relatively to the thills located near the axle and, restrained to move up and down with said body relatively
 110 to the gear, a yielding arm securely attached to the gear and extending to a point directly or obliquely above said axis about which the body rocks, means for connecting said arm with the body, substantially as described. 115

2. In a two wheeled vehicle, the combination of a body adapted to rock endwise
 120 relatively to the thills about an axis near the axle which axis is restrained to move up and down with said body, of two arms, one securely attached to the gear and extending to a point directly or obliquely above said axis about which the body rocks, the other extending from the body to the free end of said first arm, substantially as and for the purpose described. 125

3. In a two wheeled vehicle, the combination with a body hinged about an axis parallel to and near the axle by hinges connected to the gear by nearly horizontal arms, of arms
 130 securely fastened to the gear and extending to a point directly or obliquely above the axis

of said hinges, means of connecting said latter arms with the body, substantially as described.

5 4. In a two wheeled vehicle, the combination with the axle, the thills attached thereto, one or more cross bars connecting the thills, of a nearly horizontal arm hinged to the body
10 near the axle, extending forward and securely attached to the gear, and an arm attached to the body above the hinge of said first arm, and extending backward therefrom and means
15 for connecting said latter arm with the gear, substantially as described.

5 5. In a two wheeled vehicle, the combination with the axle and body, of a torsion spring
15 extending transversely across the body and securely attached thereto, arms securely attached to and extending backward from said torsion rod on either side of the body, arms
20 securely attached to the axle and extending backward and upward and having their free ends connected pivotally to the free ends of the arms extending from said torsion rod, substantially as described.

25 6. The combination with the body of the vehicle, of two substantially parallel torsion bars arranged transversely of and within the

body, said rods being securely clamped together the one having its ends securely attached to the body and the other provided
30 with arms extending backward on either side of the body and pivotally attached to the gear, substantially as described.

7. In a two wheeled vehicle, the combination with the axle, thills securely attached
35 thereto and a body, of a nearly horizontal arm extending nearly longitudinally of the vehicle, having one end securely attached to the gear and extending from said point of attachment, toward the axle and securely attached
40 to the body near the same, said arm restraining the axis about which the body rocks, to move up and down with the body, a yielding arm having its lower end securely attached
45 to the gear and extending to a point directly or obliquely above the axis about which the body rocks, means for connecting said yielding arm with the body, substantially as described.

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Witnesses:

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