

(No Model.)

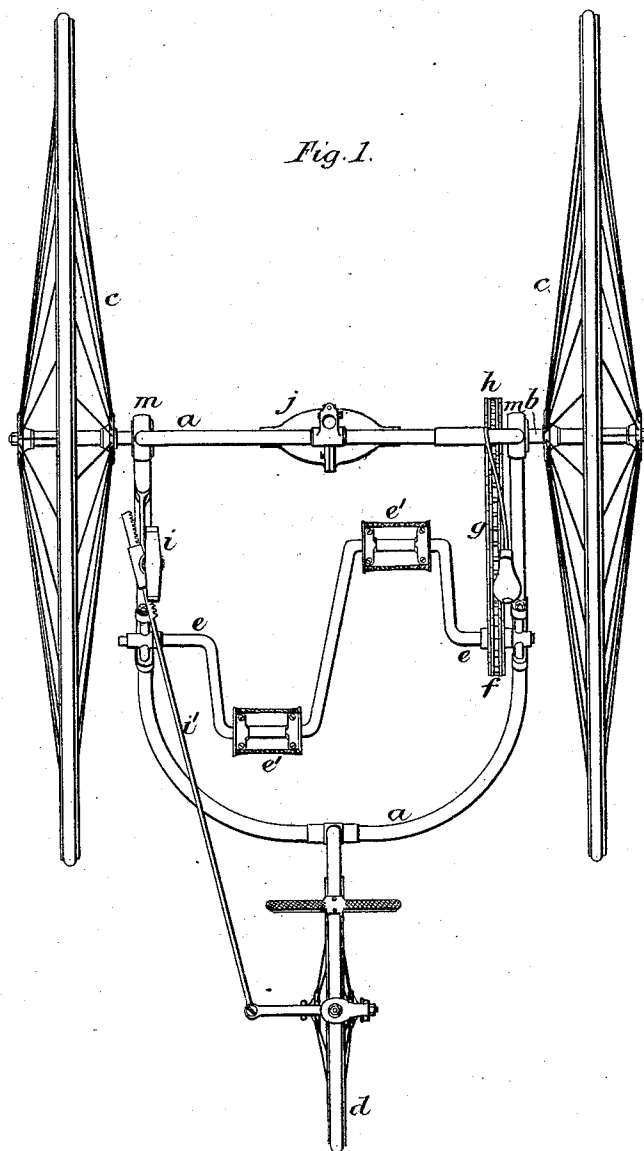
3 Sheets—Sheet 1.

W. HILLMAN.

VELOCIPEDE.

No. 247,643.

Patented Sept. 27, 1881.



Witnesses,

*J. A. Rutherford*  
*Robert Exatt.*

Inventor,

*William Hillman.*

By *James L. Norris.*  
*Atty.*

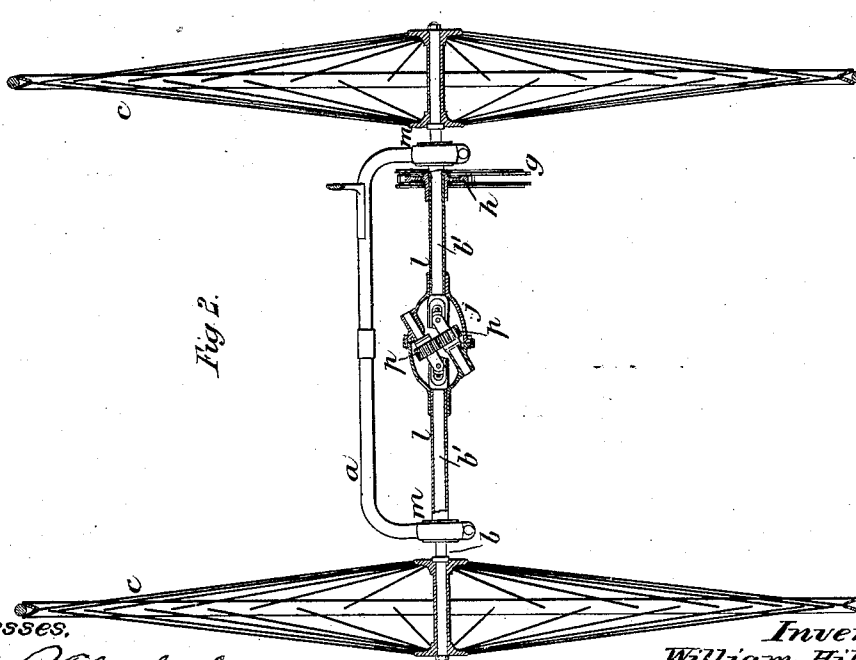
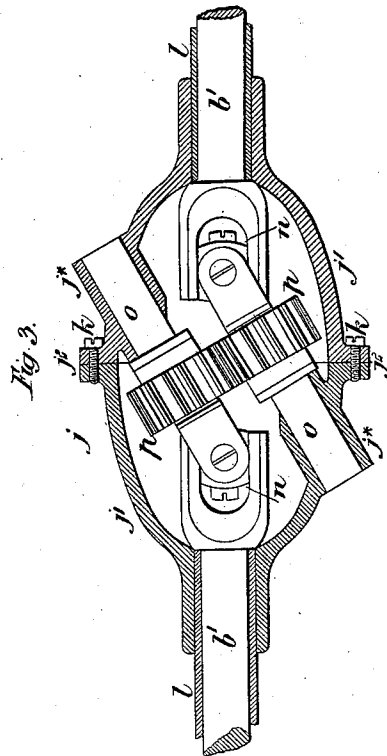
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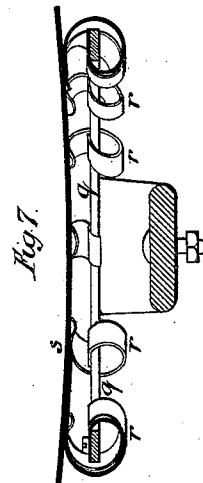
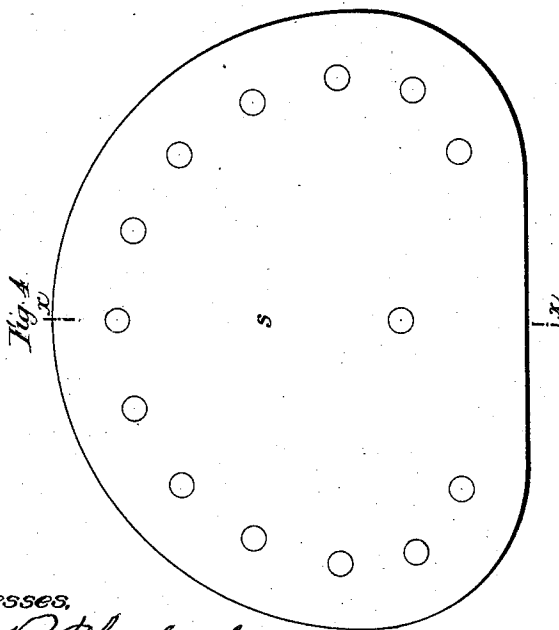
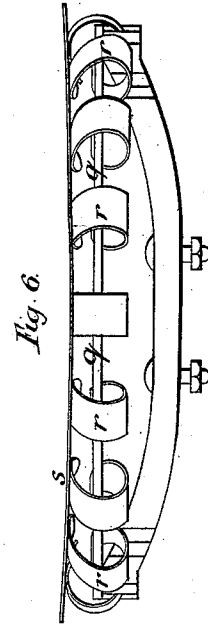
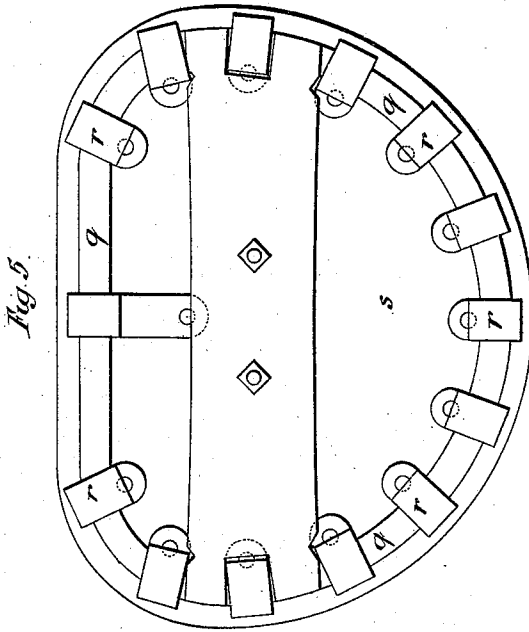
W. HILLMAN.

3 Sheets—Sheet 3

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*William Hillman.*  
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# UNITED STATES PATENT OFFICE.

WILLIAM HILLMAN, OF COVENTRY, ENGLAND.

## VELOCIPEDE.

SPECIFICATION forming part of Letters Patent No. 247,643, dated September 27, 1881.

Application filed August 25, 1881. (No model.) Patented in England October 29, 1880, and April 14, 1881.

*To all whom it may concern:*

Be it known that I, WILLIAM HILLMAN, of Coventry, England, machinist, have invented new and useful Improvements in Velocipedes, (for which I have obtained patents in Great Britain, No. 4,432, bearing date October 29, A. D. 1880, and No. 1,661, bearing date April 14, A. D. 1881,) of which the following is a specification, reference being had to the accompanying drawings.

My invention relates, chiefly, to improvements in velocipedes of that class in which there are two driving-wheels and one or more steering or guiding wheels in front of or behind the same. In a velocipede of this class the act of turning, and even the slightest deviation from a straight line or course, causes a variation or difference in the relative speed of the two wheels, and it is very desirable to provide, in combination with these wheels, efficient means for their automatic adaptation to any variation of the path or course of the vehicle. According to one part of my invention I have sought to effect this object—that is to say, I provide improved means or apparatus for effecting automatically an equal distribution or regulation of the power applied by the cranks or pedals to the two driving-wheels. This part of my invention is illustrated in Figures 1 to 3 of the accompanying drawings, in which—

Fig. 1 is a plan of a velocipede provided with the said apparatus, and Fig. 2 is a vertical section of the same through the axis of the driving-wheels. Fig. 3 is a vertical section, drawn to an enlarged scale, of the said apparatus.

*a* represents the frame-work of the vehicle, which is provided with suitable bearings for the main or driving-wheel shaft *b*. *c* represent the driving or side wheels mounted on the shaft *b*, and *d* is the steering or guiding wheel.

*e* is the crank-shaft or treadle-axis supported upon the frame-work *a*, and provided with the treadles *e'*.

*f* is a chain-wheel upon this shaft *e*, which chain-wheel imparts motion through the chain *g* to the chain-wheel *h* upon the main or driving shaft *b*.

*i* represents the steering-handle, which is connected by means of a pinion with a rack on the rod *i'*.

My improved apparatus is constructed and arranged as follows—that is to say: I form the shaft *b* in two parts, *b'* *b'*, of equal length. These two parts, when in place in the vehicle, are longitudinally in line with each other, as shown in Figs. 2 and 3, as if the shaft were made in one piece. The outer extremities of these two parts *b'* *b'* have the driving-wheels *c* keyed or otherwise firmly fixed thereon. In order to connect the inner ends of these two parts of the shaft *b*, I provide a box or case, *j*, which is preferably of elliptical form in longitudinal section and circular in transverse section. This box is constructed in two parts, *j'* *j'*, each of which forms one-half lengthwise of the same, as shown. These two parts or halves are provided with flanges *j<sup>2</sup>* *j<sup>2</sup>*, and are united by means of screws or bolts *k*, passed through the latter. In the outer ends of this box or case *j'* are fitted light tubes *l*, (preferably of steel,) which extend to the bearings *m* on the sides of the frame of the vehicle. These bearings are preferably arranged close to the inner face of the hub of the driving-wheels *c*, as shown. The two portions *b'* *b'* of the driving-shaft *b* pass through the aforesaid tubes *l* (which form a hollow shaft or sleeve) into the box or case *j*, and inside of the latter the end of each part *b'* is connected by a universal joint, *n*, with a short diagonal shaft, *o*. Each of these short shafts *o* is arranged at an angle of about thirty degrees to the axis of the main shaft, and extends from the end of the box in which it is jointed to the said shaft to a bearing, *j\**, formed in the opposite end or half of the box or case *j*, in which bearing it is supported with a capability of free rotation. These short shafts or spindles *o* are arranged parallel to each other, as shown, and are geared together by two pinions, *p*, of equal diameter, securely keyed or otherwise fixed upon the said spindles or shafts. The aforesaid two parts *b'* *b'* of the driving-shaft are capable of turning freely within the tubes *l*, through which they extend. On the outer end of one of the said tubes *l*, I fix, by brazing or otherwise, the chain wheel or pulley *h*, from which the chain *g* extends to and passes around the similar chain wheel or pulley *f* on the crank or pedal shaft *e*, as above stated. This chain-gearing serves for transmitting the power from the treadles to the said tube or hollow shaft *l*, and the latter,

through the medium of the aforesaid novel apparatus by which the two parts of the driving-shaft are united, imparts motion to the driving-wheels *c*.

5 It will be obvious that as the said box or case is connected rigidly or immovably with the said tubes, the latter in rotating will cause the bearings *j*\* to rotate around the axis of the main shaft, and as the bearing ends of the  
10 short shafts *o* participate in this movement and they are jointed universally to the two parts of the main shaft, the latter will also be caused to rotate. Furthermore, it is obvious that if the machine is traveling in a straight  
15 line there will be no action by either driving-wheel *c* to resist or prevent the equal rotation of both parts *b'* of the main shaft, so that the entire apparatus will move as one piece, or as though the wheels and jointed shafts did not  
20 exist; but on the slightest deviation of the vehicle from a straight line or path the driving-wheels will immediately resist or prevent the equal rotation of the parts of the main shaft, and then without my said apparatus  
25 there would be great friction and strain upon the said driving-wheels; but with my apparatus, arranged as shown, the toothed wheels and jointed shafts permit the two driving-wheels to adapt themselves to the different  
30 speeds required, according to the degree or extent of the deviation of the machine from a straight line or path. Therefore the said apparatus will act in such a manner as to permit the two parts *b' b'* of the shaft *b* and the two  
35 wheels *c c*, fixed thereon, to work freely under all variations of speed to which they may be subjected in the turning or steering of the velocipede.

Another part of my invention consists in the  
40 novel construction of spring saddles or seats for velocipedes. This part of the said invention is illustrated in Figs. 4 to 7 of the drawings, in which—

Fig. 4 is a plan of my improved seat. Fig.  
45 5 is an under-side view, and Fig. 6 a rear view, of the same. Fig. 7 is a vertical section of the said seat on the line *x x*, Fig. 4.

In carrying this part of my invention into  
50 practice I attach to the backbone of a bicycle, or to a suitable piece designed to be attached to the frame of a tricycle, a ring, hoop, or piece, *q*, of iron or other suitable metal, and I connect with this piece a series of **C**-springs, *r*, formed of thin steel plates. These springs

are riveted to the said hoop, ring, or piece *q*,  
55 and extend therefrom downward and then in a curved form upward to the top of the seat, as shown in Fig. 7, where they terminate and are secured to a flat circular plate formed of  
60 thin steel or other metal. I thus form a circular or approximately-circular cushion-shaped spring-seat or spring-saddle, which may be covered with leather or other suitable material. In some cases the metal plate may be  
65 dispensed with, and the volute springs *r* attached directly to the leather or other covering material, *s*, as shown. In applying this part of my invention to a bicycle it is important to provide for the elasticity of the seat  
70 without occupying unnecessary space above the backbone. I therefore arrange the said springs in such a manner that those adjacent to the backbone are sufficiently far apart to allow the backbone to pass between them, and  
75 so that their lower portions descend below the top of the said backbone, and that there shall be ample space between the latter and the top plate to allow the required freedom for the action of the said springs.

What I claim is—

1. In a velocipede, the combination, with the driving-shaft *b*, formed in two parts, *b' b'*, and extending through the tubes *l*, of the box or case *j*, provided with diagonal shafts or  
85 spindles *o*, geared together as above described, and connected by universal joints *n* with the inner ends of the said parts *b' b'*, all substantially as above set forth, and for the purposes specified.

2. The combination, with the tube *l*, having  
90 the chain-wheel *h* fixed thereon, and operated by the chain from the pedal-shaft, of the devices *o p n*, inclosed in the said box, and the two parts *b' b'* of the driving-shaft *b* and the driving-wheels *c*, all substantially as and for  
95 the purpose specified.

3. The ring or hoop *q*, connected with the frame of a bicycle or tricycle, in combination with a series of **C**-springs having their lower  
100 ends extended around the under side of the ring or hoop and attached thereto, and the saddle or seat having its outer portion attached to the upper ends of the springs, substantially as shown and described.

WILLIAM HILLMAN.

Witnesses:

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JAMES AVERY.