(No Model.) 2 Sheets—Sheet 1.

H. C. GOODRICH.

BICYCLE.

No. 456,217. Patented July 21, 1891.

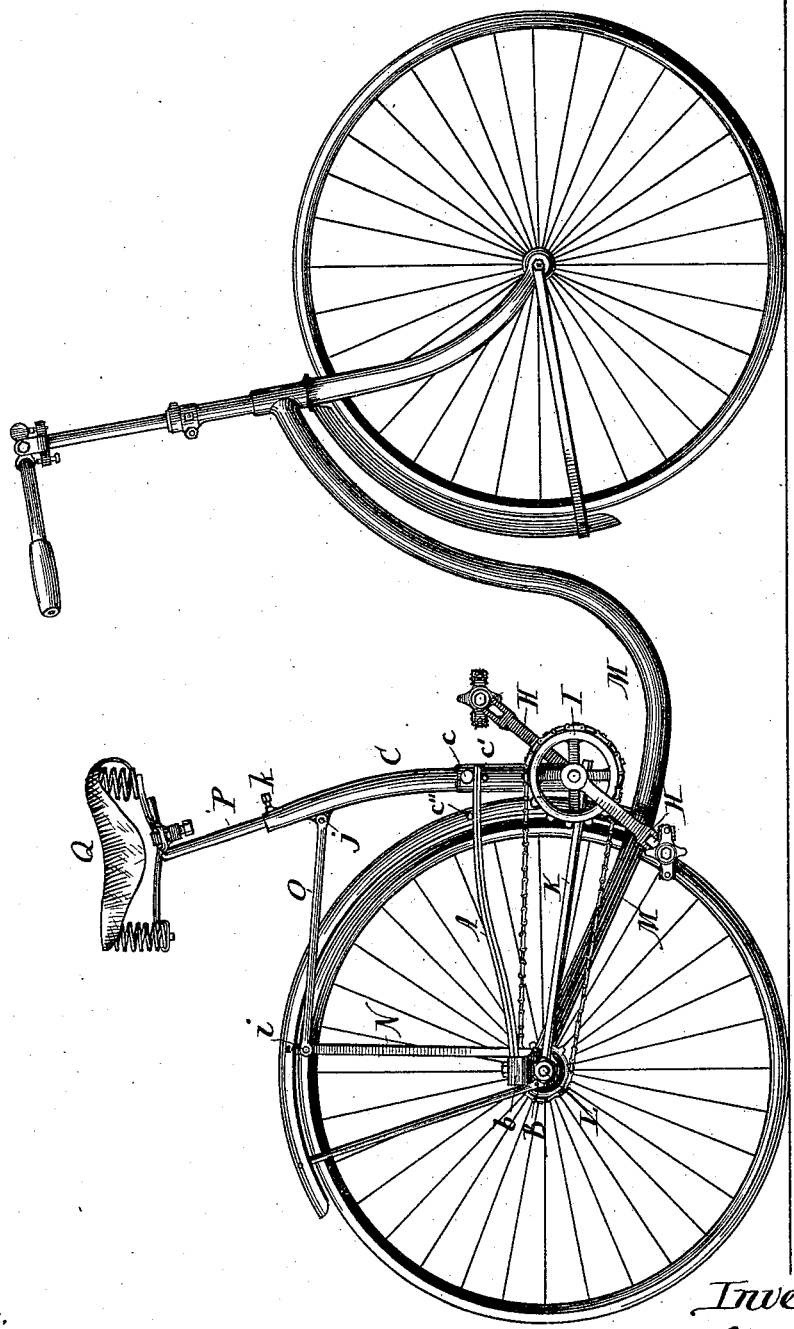


Fig. 1.

Witnesses:
C. W. Bund
Fred Gerlach

Inventor:
Henry C. Goodrich

(No Model.) 2 Sheets—Sheet 2.

H. C. GOODRICH.

BICYCLE.

No. 456,217. Patented July 21, 1891.

Fig. 2.

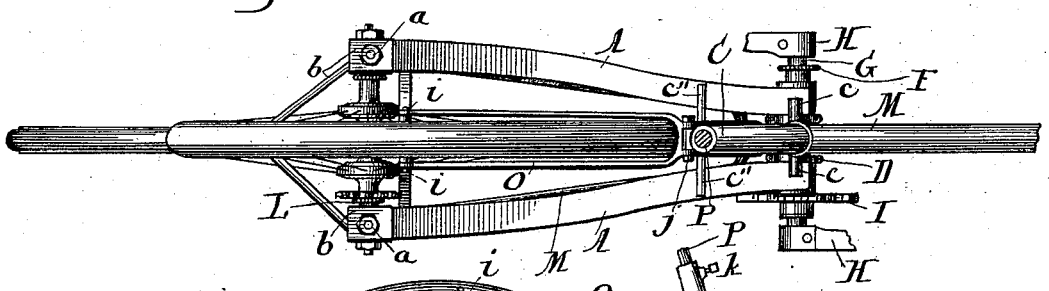


Fig. 3.

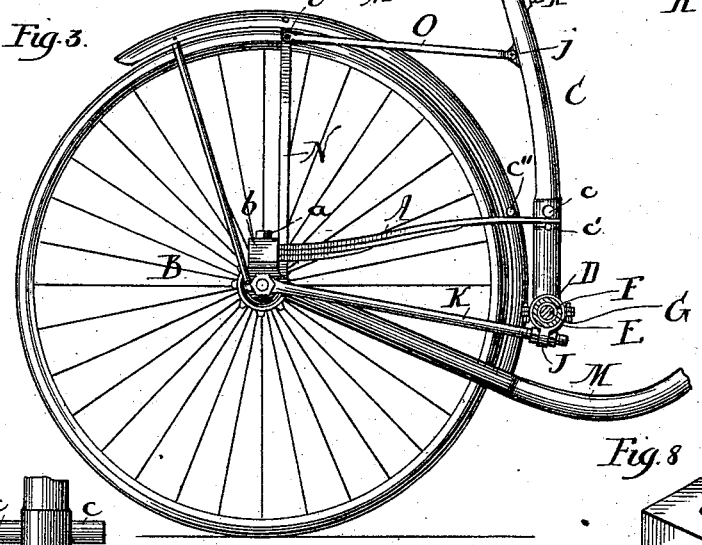


Fig. 4.

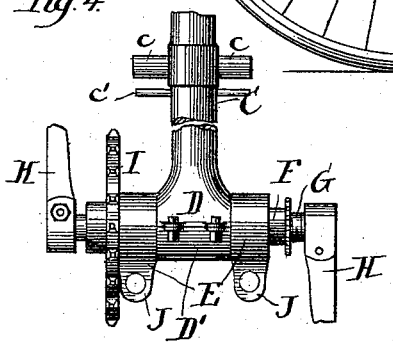


Fig. 8.

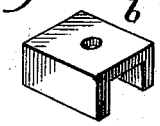


Fig. 5.

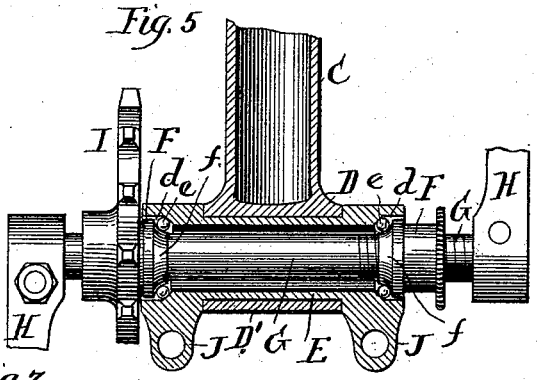


Fig. 6.

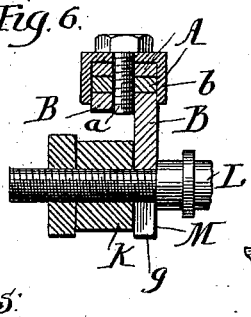
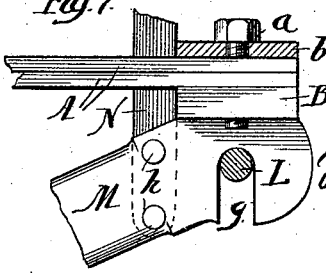


Fig. 7.



Witnesses:

O. W. Bond.

Fred Gerlach

Inventor:

Henry C. Goodrich

UNITED STATES PATENT OFFICE.

HARRY C. GOODRICH, OF CHICAGO, ILLINOIS, ASSIGNOR TO LOUISA M. GOODRICH, OF SAME PLACE.

BICYCLE.

SPECIFICATION forming part of Letters Patent No. 456,217, dated July 21, 1891.

Application filed November 11, 1890. Serial No. 371,101. (No model.)

To all whom it may concern:

Be it known that I, HARRY C. GOODRICH, a citizen of the United States, residing at the city of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Bicycles; and I hereby declare that the following is a full, clear, and exact description of the invention, which will enable others skilled in the art to which it pertains to make and use the same, reference being had to the accompanying drawings, forming a part hereof, in which—

Figure 1 is a side elevation of a complete bicycle with the improvement thereon; Fig. 2, a top or plan view of the rear of the machine, showing the flat springs carrying the seat-standard; Fig. 3, a side elevation of the rear of the machine, showing a change in the form of the flat carrying-spring. Fig. 4 is a detail, being a front elevation of the lower end of the seat-standard and the treadle; Fig. 5, a detail, partly in section, showing the attachment of the seat-standard at the lower end and the bearing for the treadles; Fig. 6, a detail in section, showing the attachment for the rear end of the flat spring; Fig. 7, a detail, partly in section, showing a side elevation of the rear end of the flat spring and its attachment. Fig. 8 is a perspective view of the cap for retaining the rear end of the flat spring in position.

This invention relates to that class of bicycles having low wheels and which are usually termed "Safeties," and in which the seat-standard and yoke have a yielding movement, while the main frame is perfectly rigid; and the object of the invention is to improve the yielding support which carries the seat-standard and the yoke, so as to prevent vibration and the effects of vibration on the rider, and have such support yield as required to take the effects of any jar or concussion, and at the same time have the support one which will prevent lateral or side play of the seat-standard and yoke and assist in holding the seat-standard in a vertical or straight line movement; and its nature consists in providing flat springs, one on each side of the machine, extending forward from the rear axle and loosely connected at the forward ends with the seat-standard, and in the several parts and combination of parts hereinafter described, and pointed out in the claims as new.

In the drawings, A represents the flat carrying-springs, one for each side of the machine, which springs, as shown in Fig. 1, each consists of two flat leaves or plates of equal length, and, as shown in Fig. 3, each spring consists of three flat leaves or plates foreshortened in length successively, the lower leaf or plate being the shortest.

B is a support formed of an upright piece or standard extending up from the rear end of each side of the fork of the rear part of the main frame. Each standard has its upper end turned at right angles to form a base for the rear end of the flat spring, as shown in Figs. 6 and 7, and the spring is attached to the base by a bolt *a*, passing through the spring and base and through the cap *b*, which cap has side flanges extending down on each side of the spring, as shown in Fig. 6, and these flanges form a side support for the spring by which the spring is locked and held firmly to the standard.

C is the seat-standard on which the seat is mounted. This standard on each side has projecting pins *c* to engage the forward end of the flat spring A on each side, and, as shown, to prevent any release of the spring ends with the vertical play of the standard, a pin *c'* is provided, between which pin *c'* and the carrying-pin *c* the end of the flat spring A is located, and, as shown, in order to prevent the upward throw of the spring above its stopping-point, a stop-pin *c''* is provided on each side of the guard for the rear wheel, against which pin *c''* the flat spring abuts when the standard C is at its normal position.

D is a half box or socket at the lower end of the standard C, and D' is a companion half box or socket for the half box or socket D, the two half boxes or sockets forming a complete box or socket for the lower end of the seat-standard.

E is a sleeve, on which is mounted the box or socket D and D', for which purpose the sleeve is cut away at the center.

F are cone-bearings for the axle of the treadles, and, as shown, these bearings at their inner ends enter an opening *d* in the ends of the sleeve E, and the cones *f* receive ball-

bearings *e*, so as to give a free movement to the treadle-axle.

G is the axle for the treadle.

H are the treadle-arms, one attached to each end of the axle G, each arm at its outer end carrying the ordinary treadle, as shown in Fig. 1.

I is the sprocket-wheel for the driving-chain, which wheel is firmly secured to the axle G.

J are ears, one projecting downward at each end of the sleeve E, as shown in Figs. 3, 4, and 5.

K are bars, one for each ear J, in which ears the said bars are secured by means of nuts, so as to be adjustable and regulate the distance between the axle of the rear wheel and the sleeve E, and these bars K, with the sleeve E, constitute the yoke which carries the seat-standard C, which yoke is wholly independent of the main frame.

L is the axle for the rear wheel, which axle is mounted in the ends of the fork for the rear portion of the main frame, and this axle at each end receives the rear end of the side bars K.

M are the side bars of the fork for the rear end of the main frame, each side bar having a slot *g* to slip over the end of the axle L, as shown in Figs. 6 and 7, and each bar M has projecting up therefrom the standard or upright B, which supports the flat spring A.

N are standards attached at their lower ends by rivets or screws *h*, one to each side bar M of the fork.

O are connecting-bars, one for each standard N, with the rear end of each bar O attached to the upper end of each standard N by a suitable pin or pivot *i* and with the forward end of each bar O attached by a suitable pin or pivot *j* to the seat-standard C, and these bars O are so connected with the standards N and seat-standard C as to run parallel with the yoke-bars K. These bars O have a standard pivoted at their rear end corresponding to the standard-pivot of the yoke-bars K at their rear end, and the forward end of the bars O move with the seat-standard, corresponding to the movement of the forward end of the yoke-bars K, the result being a perfect parallelism, by which a straight, vertical, or approximately vertical movement of the seat-standard and its seat is had, thus obviating the fore-and-aft thrust of the seat, as is the case with ordinarily-arranged seat-standards.

P is the rod carrying the seat, which rod enters a hole in the upper end of the seat-standard, as usual, and is locked therein by a set-screw *k*, and Q is the seat attached to the supporting-rod P.

The essential feature of this invention is the carrying of the seat under a uniform yielding resistance and at the same time have the seat-standard and yoke free to move independent of the main frame, thereby enabling a rigid main frame to be used for connecting the front and rear wheels, and this feature of a uniform yielding resistance is had by the employment of the long flat springs extending from the rear axle forward and loosely connected with the seat-standard, and such springs can be a single stiff spring, a two-leaf spring, or a three-leaf spring, or other form of flat spring, so long as the nature of the spring is one that will give a perfectly free and easy yielding resistance, allowing the seat-standard and yoke to rise and fall as required to prevent the effects of vibration and at the same time furnish a resistance by which the rider is firmly and securely mounted on the seat. The flat springs being long will give a gradual resistance, thereby producing an easy, soft, and perfect resistance and mount for the rider, and at the same time, these springs being rigid against lateral play, act as a brace for the standard, thereby preventing lateral or side swing of the standard and yoke, and when used in connection with a connecting-support for the upper end of the seat-standard, which support travels with the yoke, such springs, by reason of their long bearing and resistance against side-play, coact with the yoke-and-standard connection and assist in maintaining the seat in a straight-line, or approximately so, movement. The springs having a long bearing and being loosely connected at their front ends with the seat-standard have the effect of furnishing a pivot at the point of connection for the swing of the yoke without affecting the action of the spring or the result of such action on the standard, and at the same time these springs do not have and cannot have any quick or abrupt action, as the spring will be a gradual one between the seat-standard and the rear end connection for the springs, the result being that by the use of these flat springs the yoke has a perfect and uniform swing under an equal resistance, which increases as and at the time required, and the seat-standard is free from any pull or action of the spring except the resisting connection, which is all that is required, and at the same time the movement of the yoke and standard is one which does not interfere with the operation of the machine. The forward end of the spring can be loosely connected with the standard by looping the end of the spring over the pin *c*, so as to leave a fore-and-aft play, and the pins *c* can each have a sleeve or a thimble thereon to engage the face of the spring and furnish a rolling bearing for the connection.

I do not claim herein, broadly, a rigid connection between the seat and pedal-shaft, parallel links, substantially equal in length, attached to the said connection and to the frame of the machine, the four points of connection of said links forming approximately a parallelogram, a spring attached at one end to the frame of the machine and supporting the pedal-shaft and the seat, and a stop on the frame limiting the upward movement of the spring at the end supporting the pedal-shaft and seat, as such form substantially the

subject-matter of the claims of my pending application, filed November 27, 1889, Serial No. 331,798; but

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

1. The flat leaf-springs A and standards B for attachment of the rear end of the springs A, in combination with the seat-standard C and carrying-pins *c*, substantially as and for the purposes specified.

2. The flat springs A, standards B, bolts *a*, and caps *b* for securing the rear end of the springs A, in combination with the seat-standard C and carrying-pins *c*, substantially as and for the purposes specified.

3. The flat springs A and standards B for attachment of the rear ends of the springs A, in combination with the standard C, carrying-pins *c*, and guide-pins *c'*, loosely connecting the springs with the standard, substantially as and for the purposes specified.

4. The flat springs A and standards B, receiving the rear ends of the springs A, in combination with the seat-standard C, carrying-pins *c*, yoke-arms K, having a jointed connection with the lower end of the standard C, uprights N, and connecting-bars O, pivoted to the uprights N and to the standard C, substantially as and for the purposes specified.

HARRY C. GOODRICH.

Witnesses:
O. W. BOND,
B. A. PRICE.