(No Model.) 2 Sheets—Sheet 1.

T. B. JEFFERY.

VELOCIPEDE.

No. 312,473. Patented Feb. 17, 1885.

Fig. 1.

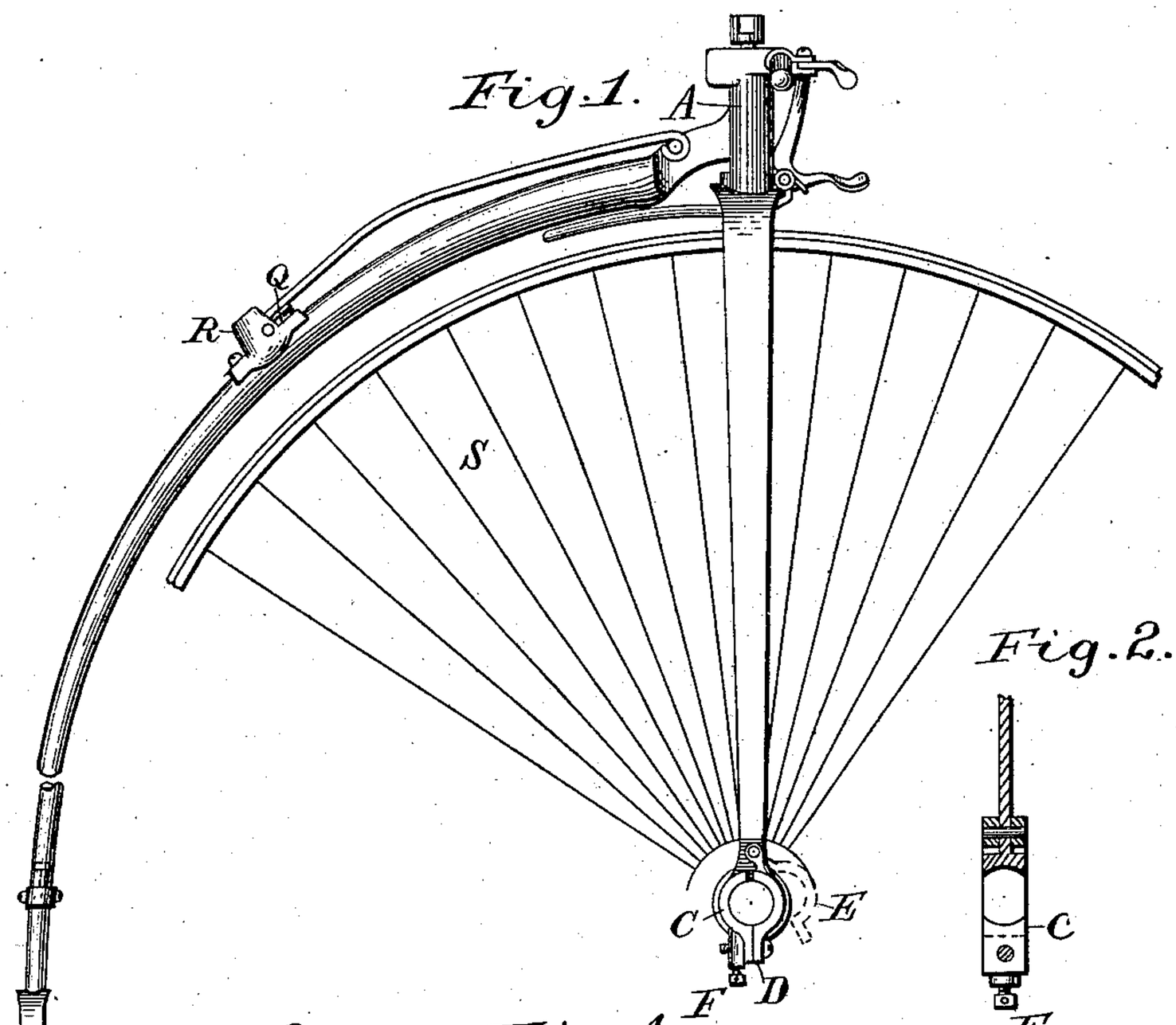


Fig. 2.

Fig. 3.

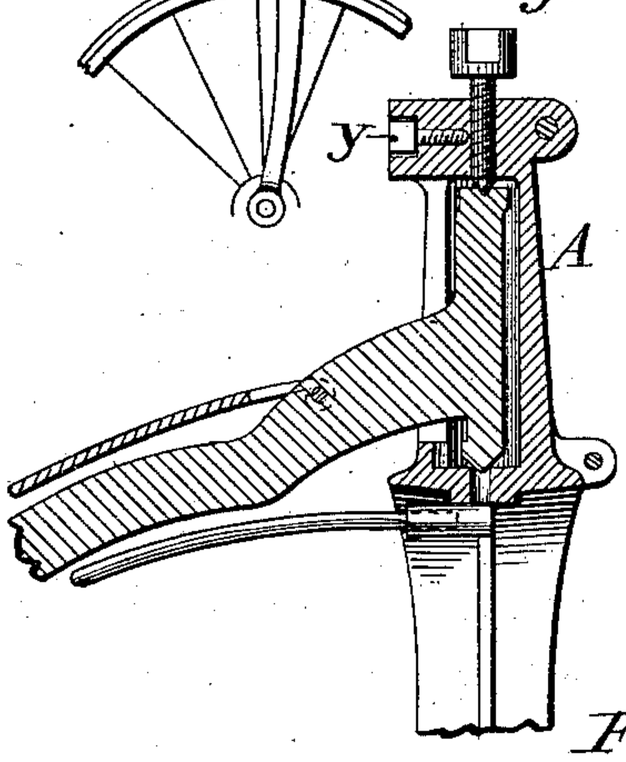


Fig. 4.

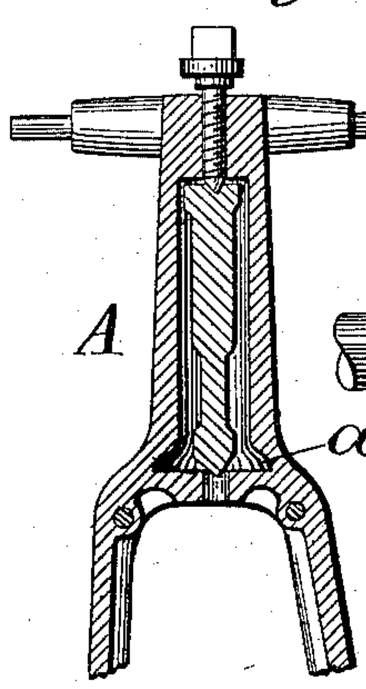
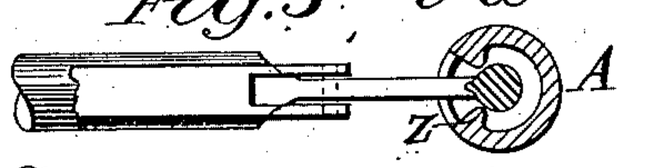


Fig. 5.



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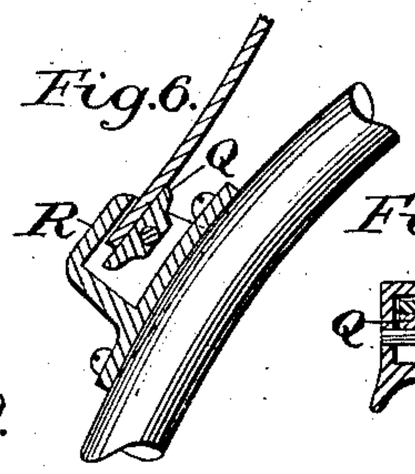

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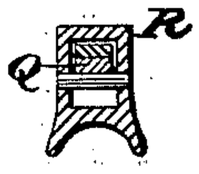

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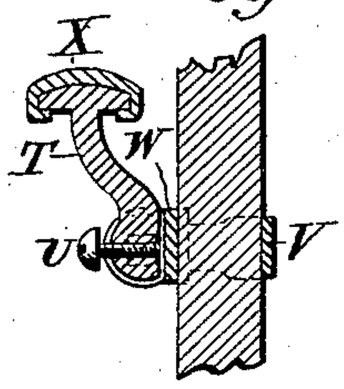

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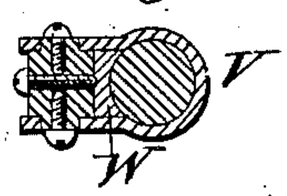

Witnesses:
Chas. S. Burns.
L. J. W. Birn

Inventor.
Thos. B. Jeffery

(No Model.) 2 Sheets—Sheet 2.

T. B. JEFFERY.

VELOCIPEDE.

No. 312,473. Patented Feb. 17, 1885.

Fig. 10.

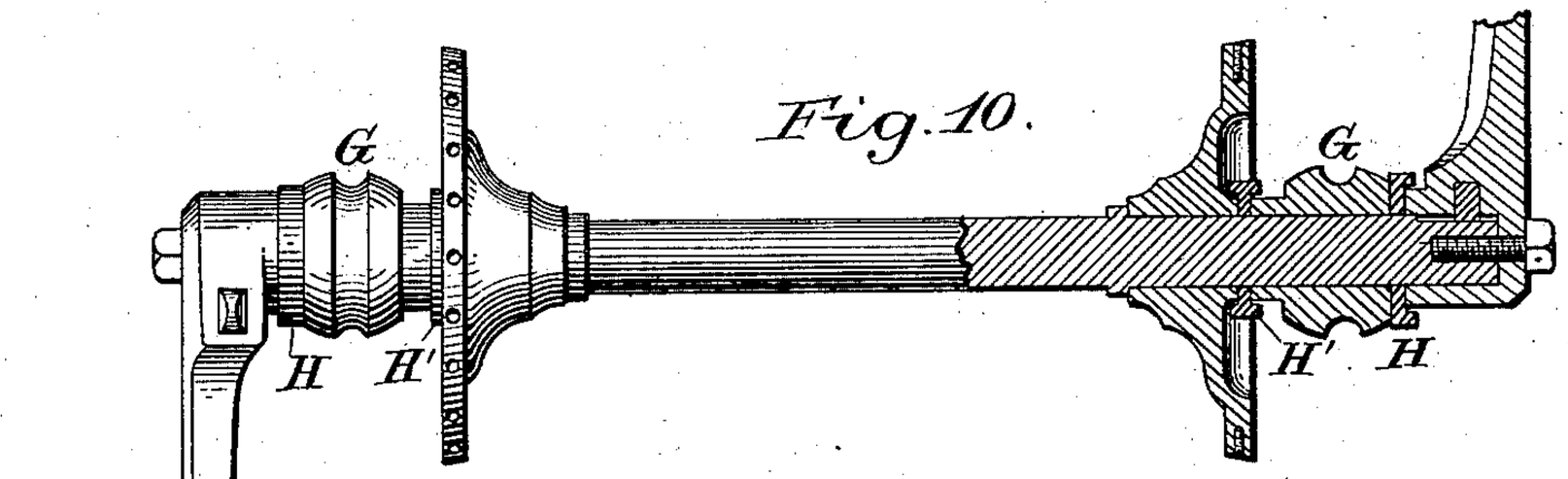

Fig 11

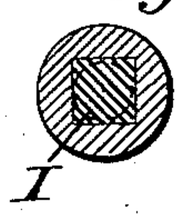

Fig. 12.

Fig. 13.

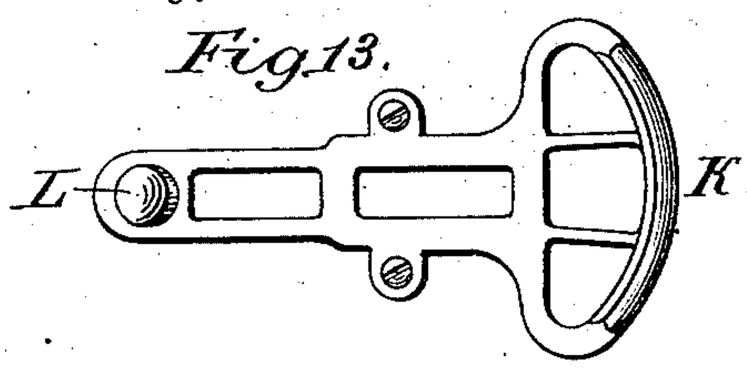

Fig. 14.

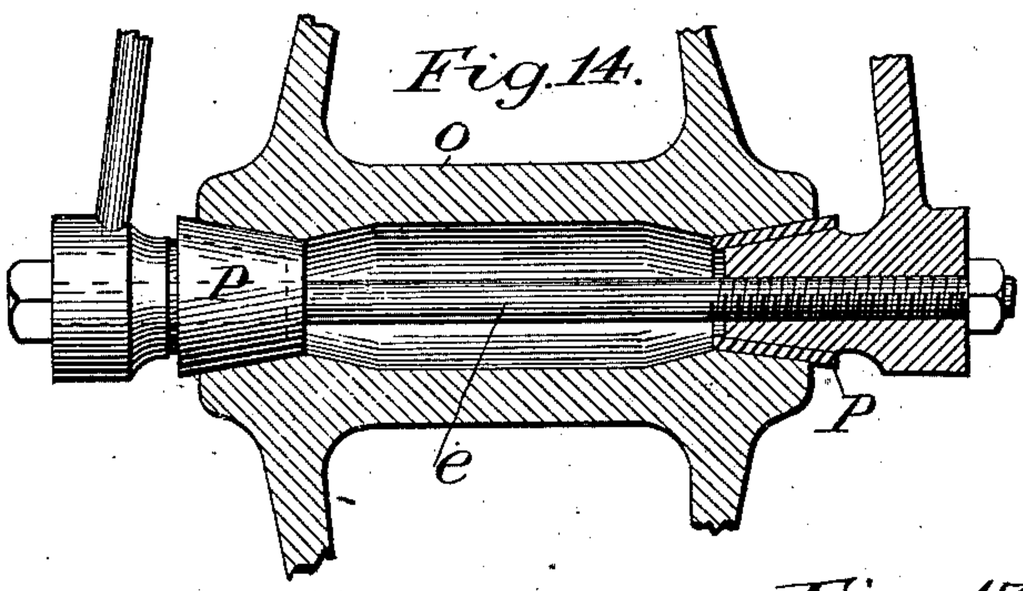

Fig. 15.

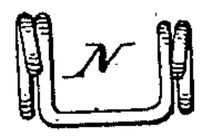

Fig. 16.

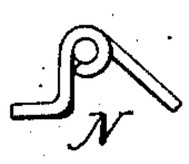

Fig. 17.

Witnesses:
Chas. S. Sturos.
L. J. W. Birz

Inventor.
Thos. B. Jeffery Jr.

UNITED STATES PATENT OFFICE.

THOMAS B. JEFFERY, OF CHICAGO, ILLINOIS.

VELOCIPEDE.

SPECIFICATION forming part of Letters Patent No. 312,473, dated February 17, 1885.

Application filed February 14, 1884. (No model.)

To all whom it may concern:

Be it known that I, THOMAS B. JEFFERY, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a new and useful Velocipede, of which the following is a specification.

My invention relates to improvements in the variety of velocipedes termed "bicycles," but certain improvements may with advantage be used on tricycles.

The object of my invention is to produce a velocipede that can be more durably constructed than at present at a minimum cost, and have qualities as desirable as those now constructed at greater expense. I attain these objects by the mechanism illustrated in the following specification, in which—

Figure 1 represents a side view of the frame of the machine, with a portion of the wheels; Fig. 2, a section of the joint of the main bearing; Figs. 3 and 4, side and end sections of the head; Fig. 5, a horizontal section of the same; Figs. 6 and 7, sections of the fastening of the spring where it joins the backbone; Figs. 8 and 9, sectional views of the step; Fig. 10, view of the axle, partly in section; Fig. 11, section of the pedal-rubber; Figs. 12 and 13, views of the seat; Fig. 14, of the rear axle; Figs. 15 and 16, side and end views of the brake-spring; Fig. 17, a section of the felly of the wheel.

Similar letters refer to like parts throughout the several views.

In carrying out my invention I construct each of the lower ends of the front fork, A, with an elongation extending below the axle C. This elongation, which half encircles the shaft, is provided with an ear or lug, D, by which a cap, E, may be fastened to it, and is hollowed on the side nearest the axle, as will be further shown. The cap E is formed with a hinged joint at its upper end and a lug, D, at its lower end, the lug corresponding in position to one on fork, and held thereto by a cap-screw and a set-screw, F, made to impinge against the cap-screw; or the position of the two joints may be reversed, the hinge being placed below and the screws with lugs above, if desired, the former method being, however, preferred. The elongation B and cap E together form a concave chamber that incloses the bearing-sleeve G, having a globular form capable of turning to some extent in either direction when in the chamber, to prevent the axle turning hard, if extreme care is not used in truing the ends of the forks.

The bearing-piece may be a hollowed ring to receive a series of steel balls on which the axle may run, or of any other pattern that will diminish friction. The form I find to be strongest and least costly is a plain cylindrical sleeve fitting an axle made as small as may be thought necessary and consistent with proper strength, and the axle extended outward from the sleeve to receive the crank without being reduced in the usual way to form a shoulder for the crank to abut against.

The ends of the bearing-sleeve, formed with faces to bear against the hub and crank, respectively, prevent any lateral motion of the axle, and any wear in either of the surfaces can be compensated for by placing the crank closer on the axle, the absence of the shoulder admitting of this adjustment.

Between the bearing-sleeve G and the shoulders that hold it in place are the steel washers H. These are formed with flanges that to some extent close the joint and prevent the entrance of dust and diminish friction.

In constructing the wheel in the usual manner a steel felly having a crescent-shaped section is employed. Through the center of the crescent must be provided holes for the reception of spokes. The crescent form is modified in various ways, becoming more or less like a U or V. All of such patterns have the center the thickest portion. As this is the place where the holes are drilled, it will be seen that the felly is much weakened by such drilling in its thickest place. To obviate this and to diminish the expense of drilling the holes, I make the center thinner than the portion near it, as shown at Fig. 17, S, and the metal that should be in the center placed at the sides, which are to that extent strengthened. The holes being then formed in the thin portion requires less labor, and the rim is not so much weakened by the necessary drilling.

In forming the head I employ the design known as the "closed form"—that is, of cy-

lindrical shape, with a cavity in which the neck turns, and an opening at the back to admit it and allow it to turn on its pivot. As the opening necessarily weakens the side it occurs in, and as this side is exposed to severe strains, I find it advantageous to stiffen the same by forming ribs on each side of the opening, as shown at Z, Fig. 5, placing them on the inner side, that the labor of polishing the head is not increased by the presence of the ribs. The bottom of the cavity is extended partly into the forks at *a*, to diminish the amount of metal at that point, which, besides reducing weight, makes the head less liable to crack in the process of manufacture when produced from malleable iron by the casting process.

At the upper portion of the head A is provided the ordinary center screw and a lateral set-screw to clamp the center screw. This lateral set-screw is objected to on account of its head projecting and catching on any fabric that may be exposed to its action. I therefore provide for its head *y* a cavity or guard, into which it is sunk and partly concealed, using for its adjustment a wrench adapted to fit and turn it when required. Thus the principal objection to the employment of the lateral screw is obviated.

The handles are usually secured to the bars by a screw-thread tightening them against a shoulder on the bar at the ferrule, the bar being reduced in diameter to form it. As the handles are liable to be split by the machine falling and driving the shoulder into the wood, I avoid this by forming the abutment or shoulder at the outer end, leaving the bar its full size at the end, so that the blow received in falling is met by the solid end of the wood portion, *c*, which is re-enforced by the rubber cover *d*, and prevented from turning or being removed by a lining of cement, *b*.

In clamping the step I use a band of metal partially encircling the backbone, the two ends being held together and embracing the step T at its base. The step stands out from and above the clamp V. At its base is a set-screw, U, made to press the backbone and clamp it tightly, the block W being interposed to protect the latter from becoming injured by such clamping.

In riding on the step of a velocipede previous to springing into the saddle, I find the machine will run farther without effort on the part of the rider and the leap into the saddle can be aided by making the step elastic. For this purpose I employ a cap of elastic rubber of considerable thickness surmounting the step proper, which, by yielding somewhat under the weight of the rider as the wheel goes over obstacles, prevents much of the power being lost by the frequent rising and falling of the load. The rubber also acts in the manner of a spring-board, and assists the rider in lifting himself into the seat.

In forming the seat I also employ rubber interposed between the leather cover J and the iron frame which supports it, using at the rear, for convenience, a short piece of cylindrical rubber, K, placed as shown, and at the front a dome-shaped piece, L, resting on the front edge of its base, and on which it may be tilted or inclined to adjust the tension of the covering-leather by the screw M.

The seat provided with rubber cushion may be fastened to the backbone in any convenient way, either directly or to a spring placed below it. The spring is secured to the front of the backbone in the ordinary manner. The rear portion of the spring is made to slide in the rectangular opening of an attachment, R, secured to the backbone. This attachment on which the spring slides, contains a rocking plate, Q, consisting of a small plate of metal having a notch in its under side, which, resting on a bar or support at the lower edge of the opening, supports the spring, allows it to slide, and by its angular movement accommodates itself to the different positions of the spring in the act of bending, and the notch referred to allows the piece to be readily placed or detached when required. The attachment R should have its rear part inclosed, forming a shield, as shown in Fig. 6, to avoid danger of injury to the rider's dress from oil or protruding edges.

The brake-spring N, Figs. 15 and 16, (shown also under the brake in Fig. 1,) is formed of wire coiled in a spiral form around the point on which the brake is hinged, as shown, one extremity of the coil resting under the brake and the other against the head, and is adjusted so that the shoe of the brake is pressed upward.

The rear fork is provided with cone-shaped inner projections, on which the rear hub, O, turns. These being subject to considerable wear, and the material used for the forks being too soft to long resist this action, I have provided steel taper sleeves P as caps or covers, suitably hardened, that fit closely on the inner projections, and are secured so that they will not turn with the axle. These resist the wearing action and add much to the durability of that part of the machine.

The screw *e*, having threads fitted to the coned ends of the fork, is employed to hold both cones close to the rear hub, and the set-nut on its outer end forms a lock to prevent its displacement.

I am aware that bicycle-forks have been previously formed containing oscillating bearing-boxes and with divisions to admit the bearing-boxes; but such divisions have been made horizontally, and thus formed they clamp the box in a vertical direction, leaving it free to oscillate horizontally. Now, in use the weight of the rider and necessary jolting over inequalities in road slightly bend the forks outward and inward, thus calling for constant movement between the box and fork end on the upper and lower sides only. It is therefore evident that the best direction to clamp

it is in the line where there is least motion—that is, a horizontal direction and on a line drawn through the axle near its center. I do not claim, broadly, an oscillating bearing-box.

I claim as my invention—

1. In combination with a bicycle fork and axle, an oscillating bearing-box fitted to and clamped between opposite sides of the fork ends horizontally across the axle, near its center, for the purpose described, substantially as set forth.

2. The combination of the bearing-box fork end, adjusting-screw, and impinging screw, for the purpose described, substantially as set forth.

3. The bearing boxes or sleeves having their outer faces abutting against the crank-faces and their points of contact protected from injury by the flanged washer, substantially as described, for the purpose set forth.

4. The head having the inner side of the opening which admits the neck re enforced by vertical ribs, substantially as and for the purpose described.

5. In combination with the wheel of a velocipede, having a rubber tire, the steel felly formed with a thin center where the spokes are placed and thicker material at the sides, substantially as described, for the purpose set forth.

6. In the head of a bicycle having a vertical center screw fastened by an impinging set-screw, the recess or guard covering the head of the impinging screw, substantially as and for the purpose described.

7. The head having the cavity in which the neck turns extended sidewise at the base, to diminish the amount of metal, for the purpose described, substantially as set forth.

8. The leather seat-cover, supported at the ends by a metal base, and having rubber cushions placed between the leather and the support, substantially as set forth.

9. The loop or attachment R, having the plate Q, provided with a notch on its under side, and resting on the under side of the opening in which it rocks, substantially as described, for the purpose set forth.

10. The attachment R, provided with a portion that extends backward, forming a hood covering the end of the spring, substantially as and for the purpose described.

11. The wire brake-spring bent spirally around the axis of the brake, having portions pressing on the head and brake, substantially as and for the purpose set forth.

12. The steel conical caps or covers secured on the inner conical ends of the rear fork, substantially as and for the purpose described.

13. In a bicycle-head formed of malleable iron by the casting process, the cavity in which the neck turns, provided with lateral cavities formed at the junction of the fork and head, substantially as described, for the purpose set forth.

THOS. B. JEFFERY.

Witnesses:
P. F. ZINK,
CHARLES S. NEEROS.