(No Model.) 2 Sheets—Sheet 1.

E. G. LATTA.

BICYCLE.

No. 324,264. Patented Aug. 11, 1885.

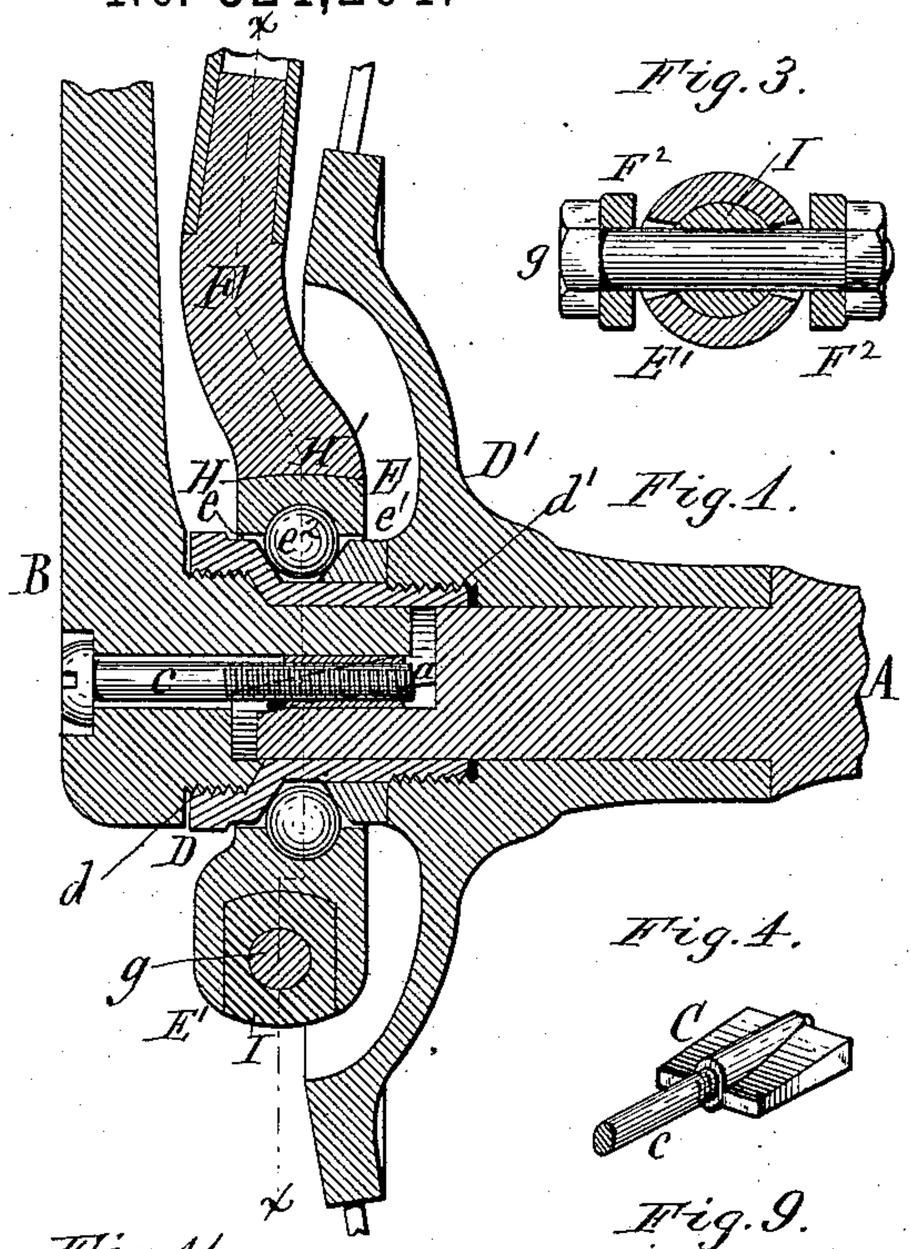

Fig. 1.

Fig. 3.

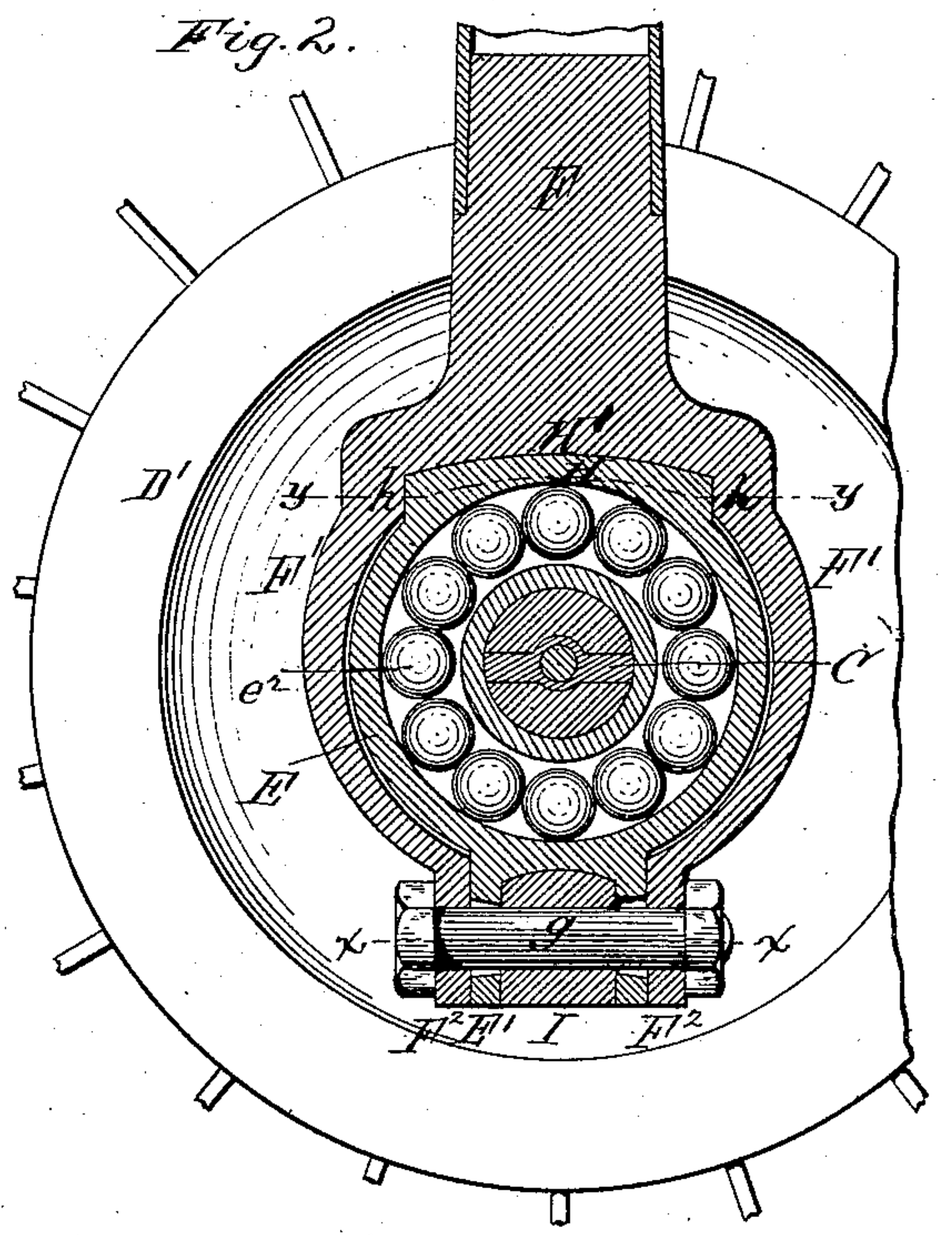

Fig. 2.

Fig. 4.

Fig. 9.

Fig. 11.

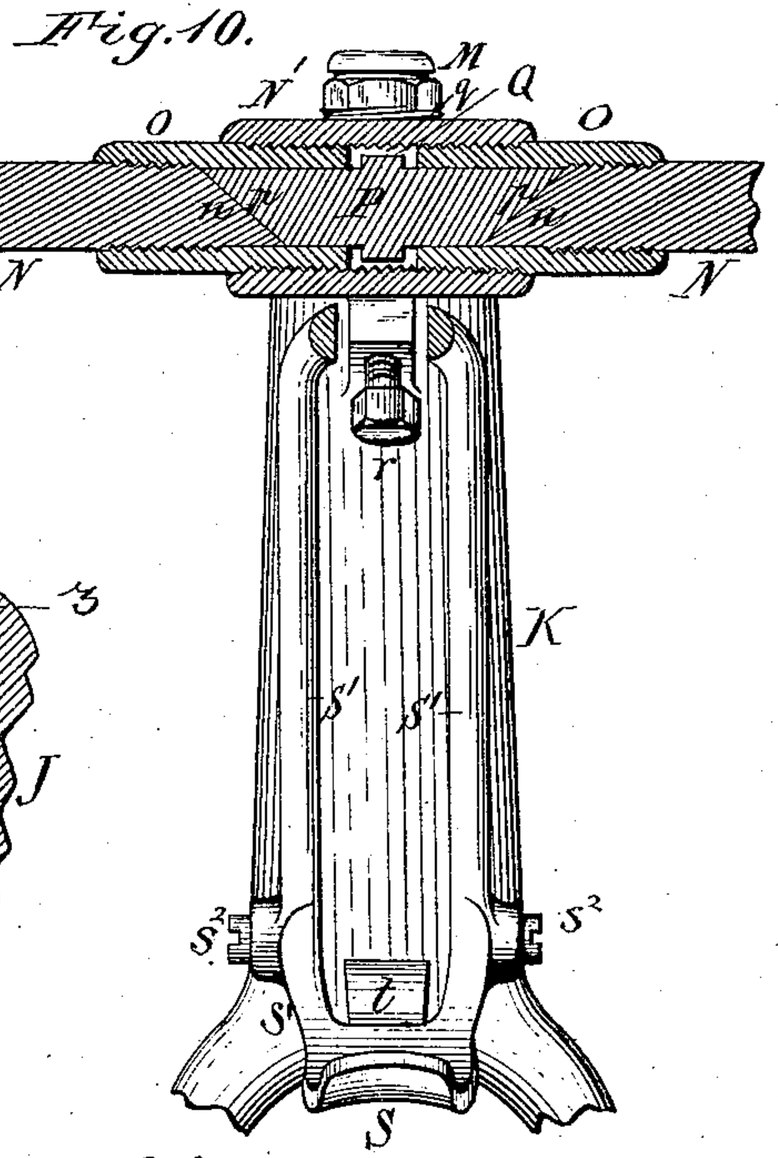

Fig. 10.

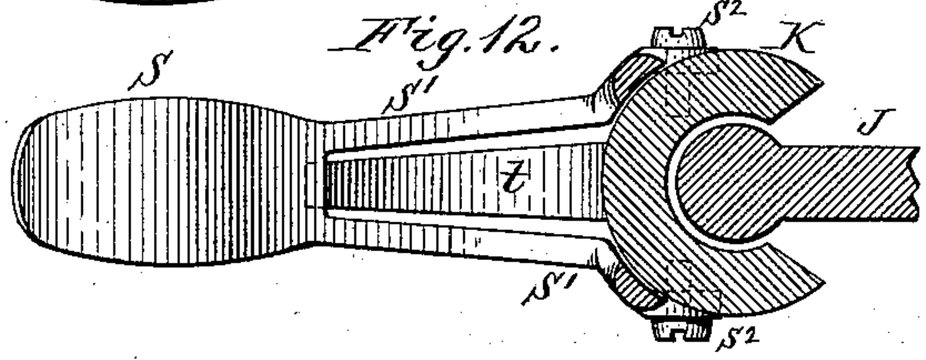

Fig. 12.

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Theo. L. Popp

Chas. J. Buchheit } Witnesses.

(No Model.) 2 Sheets—Sheet 2.

E. G. LATTA.

BICYCLE.

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Fig. 5.

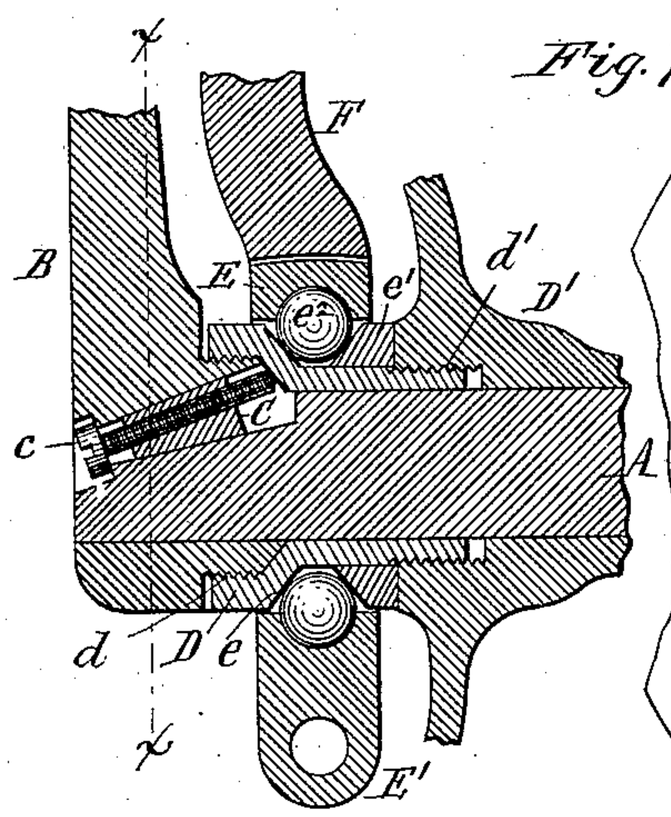


Fig. 7.

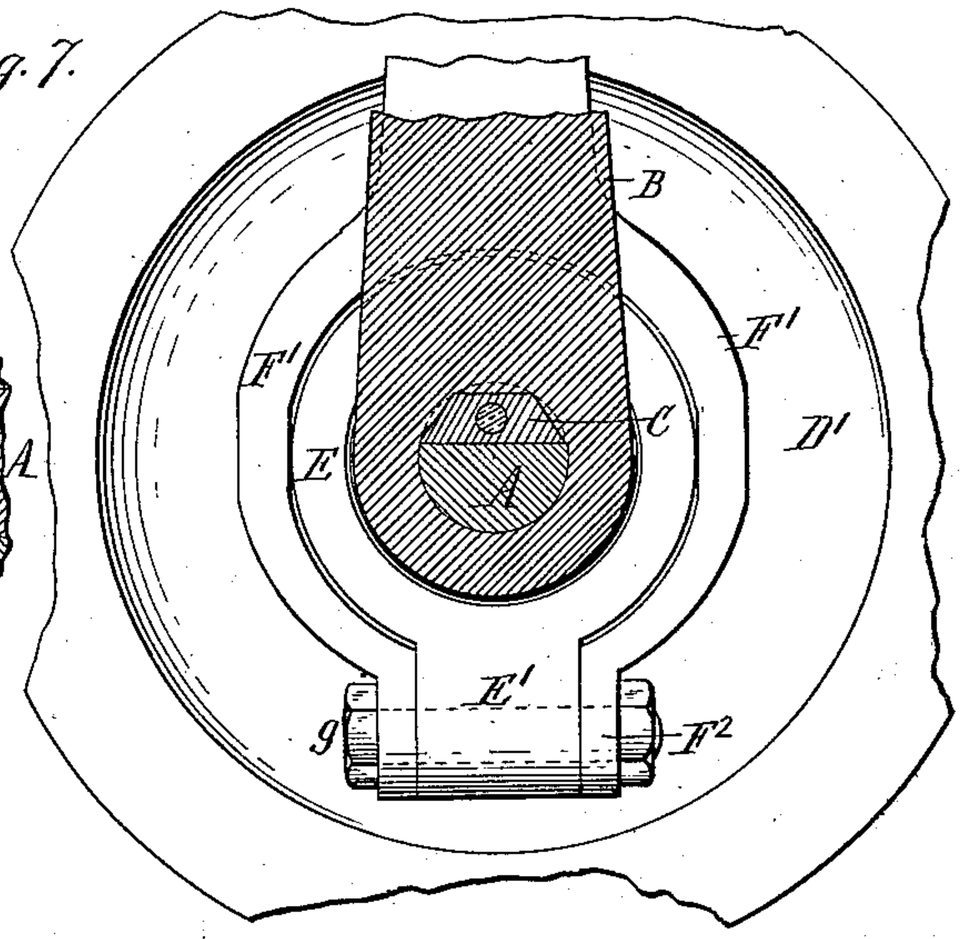


Fig. 6.

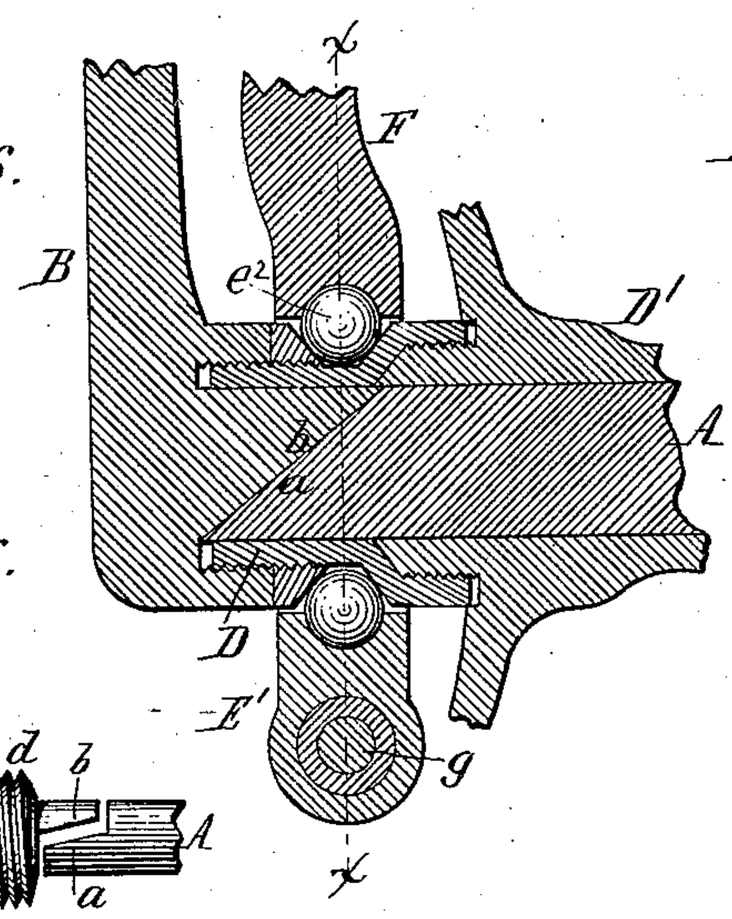


Fig. 8.

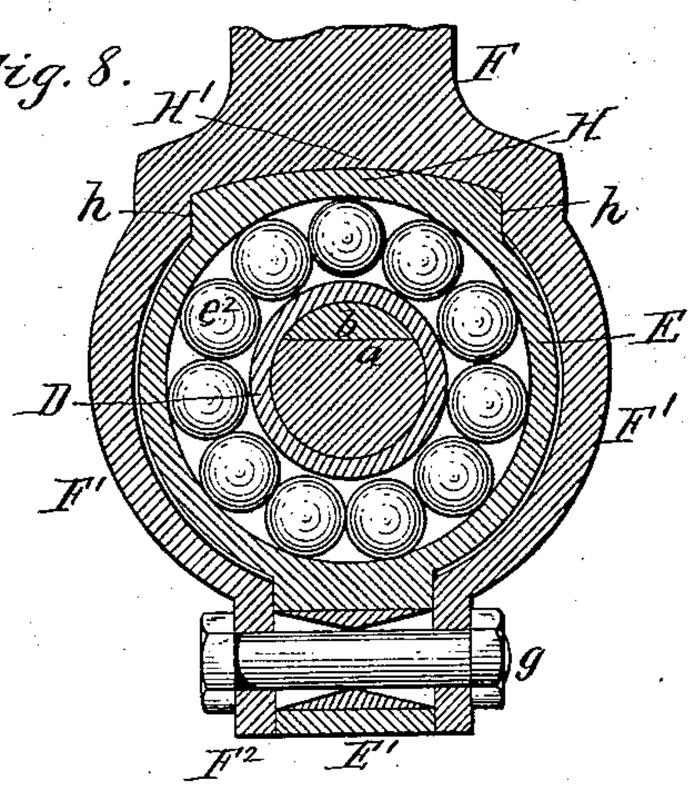


Fig. 16.

Fig. 13.

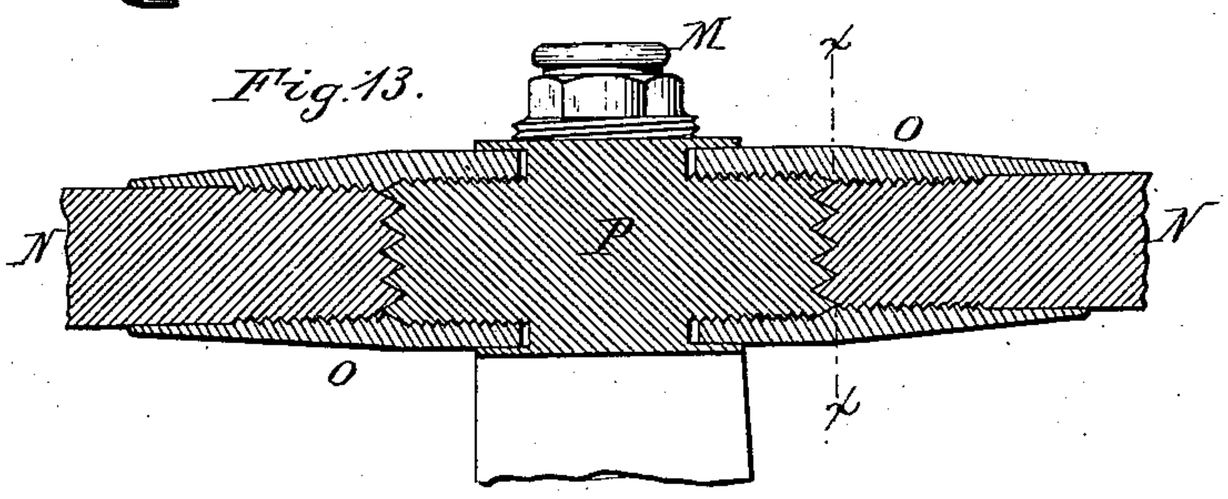


Fig. 14.

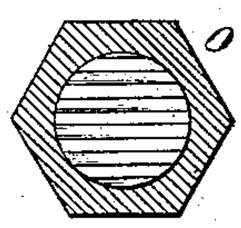
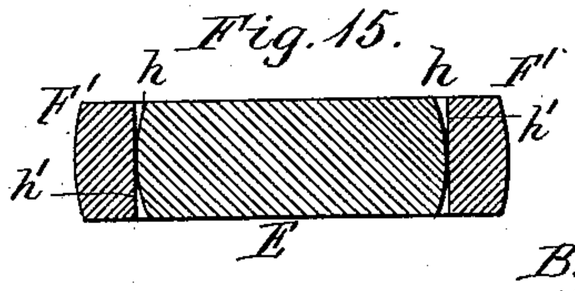


Fig. 15.



Witnesses:
Theo. L. Popp.
Chas. J. Buchheit.

E. G. Latta Inventor.
By Wilhelm & Bonnier.
Attorneys.

UNITED STATES PATENT OFFICE.

EMMIT G. LATTA, OF FRIENDSHIP, NEW YORK, ASSIGNOR TO THE POPE MANUFACTURING COMPANY, OF HARTFORD, CONNECTICUT.

BICYCLE.

SPECIFICATION forming part of Letters Patent No. 324,264, dated August 11, 1885.

Application filed April 29, 1884. (No model.)

To all whom it may concern:

Be it known that I, EMMIT G. LATTA, of Friendship, in the county of Allegany and State of New York, have invented new and useful Improvements in Bicycles, of which the following is a specification.

The object of my invention is to secure the crank and handle-bars in such manner that in case of a fall they will be detached from the machine by the breakage of the attaching device, thereby avoiding the breakage of or injury to the same, and saving the more expensive parts of the machine; also, to prevent the crank and handle-bars from working loose, and to provide means for removing the same readily, if desired; also, to provide means for adjusting the handle-bars at different positions; also, to secure the adjustment of the steering-head without the employment of an outside check-nut, and to construct the dust-cap over the steering-head center in such manner that the center can be oiled without removing the cap; also, in securing the crank in such a way that the means for securing it also serves to adjust the bearings; also, to attach the bearing to the fork or frame in a way that will prevent it from working loose at the joint, and at the same time provide a universal coupling between the fork and frame, whereby the machine will run free at all times; also to improve the construction of the brake.

My invention consists to these ends of the improvements in the construction of the machine, which will be hereinafter fully set forth, and pointed out in the claims.

In the accompanying drawings, consisting of two sheets, Figure 1 is a vertical section of one end of the axle and parts connected therewith. Fig. 2 is a vertical sectional elevation in line *x x*, Fig. 1. Fig. 3 is a horizontal section in line *x x*, Fig. 2. Fig. 4 is a perspective view of the wedge interposed between the crank and axle. Figs. 5 and 6 are vertical sections showing modified constructions of the device, whereby the crank is attached to the axle. Fig. 7 is a vertical sectional elevation in line *x x*, Fig. 5. Fig. 8 is a vertical section in line *x x*, Fig. 6. Fig. 9 is a vertical longitudinal section of the steering-head. Fig. 10 is a front elevation thereof, partly in section, the plane of section being taken in line *x x*, Fig. 9. Fig. 11 is a horizontal section in line *y y*, Fig. 9. Fig. 12 is a horizontal section in line *z z*, Fig. 9. Fig. 13 is a vertical cross-section showing a modified construction of the handle-bars. Fig. 14 is a cross-section in line *x x*, Fig. 13. Fig. 15 is a horizontal section in line *y y*, Fig. 2. Fig. 16 is a side elevation of the crank and axle on a reduced scale.

Like letters of reference refer to like parts in the several figures.

A represents the axle, provided with flattened inclined ends *a*, and B the crank provided with an inclined inner end, *b*, overlapping the inclined end *a* of the axle.

C is a wedge or inclined key interposed between the inclined ends *a* and *b* of the axle and crank, and attached to the inner end of a screw, *c*, arranged axially in the crank B, and working in a threaded opening in the wedge C, the head of the screw bearing against the outer side of the crank.

D represents a sleeve whereby the crank is connected with the axle, the sleeve being provided with an outer screw-thread, *d*, whereby it is attached to the hub of the crank, and an inner screw-thread, *d'*, whereby it is attached to the hub D', secured to the axle. One of the screw-threads, *d*, is a right-hand thread and the other a left-hand thread, so that by turning the sleeve the axle and crank will be drawn toward each other until the overlapping ends *a b* are firmly clamped against the adjacent sides of the wedge C. The wedge C may, however, be omitted, and the overlapping ends of the axle and crank may be fitted directly against each other.

Instead of a right and left hand thread, one end of the sleeve may be provided with a fine thread and the other with a coarse thread, or a thread of greater pitch, whereby the same result will be attained, the essential feature of this construction being the connection of the axle with the crank by a sleeve provided with differential screw-threads, so that the two parts are drawn toward each other by turning the sleeve. The end of the axle may project into the crank, as represented in Fig. 5, or the axle and crank may lap against each other within the sleeve, as represented in Fig. 6, or a hollow axle may be used—such as is de-

scribed in Letters Patent No. 280,633, granted to me July 3, 1883—and the ends of the cranks may be secured in the center of the wheel.

The object of lapping the crank and axle within the sleeve is to make the sleeve the weakest part of the axle, and cause the sleeve to break in case of a heavy fall, which would otherwise break or bend the axle or crank. The sleeve can be more cheaply replaced than either of these parts, and as it is small an extra sleeve can be carried to be used when a sleeve is broken. This method of securing the crank to the axle gives a larger bearing-surface, and the crank is therefore not liable to wear loose, and it also avoids the use of the usual cross-keys, the ends of which are in the way, and produces a more sightly finish. The end of the sleeve is made of any desired form to receive a tool or wrench for turning it. I prefer to make one end of the sleeve larger than the other, with an internal screw-thread, the outside being made in the form of a screw-nut. This end of the sleeve can be screwed onto the hub of the crank, or to a projection of the wheel-hub, or directly to the axle. The outer enlarged end of the sleeve D is provided on its inner side with a cone, *e*, which forms the adjustable part of the bearing.

e' represents the inner cone, and e^2 the balls interposed between the cones *e e'* and the bearing-box E. The cone *e'* may be made separate, as shown in Fig. 1; but for cheap work it may be formed in one piece with the hub D', or with the hub of the crank B. Both cones may be made separate from the sleeve D, if desired. When the bearings require to be adjusted, the screw *c* is unscrewed slightly to permit the wedge C to be pushed back, and the sleeve is turned enough to take up the wear and at the same time again secure the crank to the axle.

In the case of bearings adjusted in the box the cones are omitted and a simple groove is formed around the center of the sleeve, and both ends of the sleeve are provided with internal screw-threads, while in the case of parallel bearings both ends of the sleeve can be made of smaller size and provided with external screw-threads engaging in threads in the wheel-hub and the crank-hub, or with internal threads engaging with the two parts of the axle.

I am aware that a sleeve to receive the wear has been used; but such a sleeve was loose on the axle or secured to the axle between the hub and crank. This is essentially different from the construction hereinbefore described, in which the sleeve is employed for securing the crank to the axle, and in which the sleeve serves as a safety-coupling, which saves the more valuable parts of the machine.

F represents the inner arm of the fork or frame which straddles the wheel. The lower portion of the fork F is bifurcated, as shown at F', and embraces the bearing-box E. The latter is provided on its under side with a lug, E', extending downwardly between lugs F^2, formed at the lower ends of the bifurcated portion F' of the fork F. The box E is secured to the fork F below the axle by a horizontal bolt, *g*. This construction prevents the joint from working loose, which it usually does when located above the axle. The outer edges of the bearing-box are preferably rounded off, so that the fork can spring in or out without touching the box, except at the shoulders *h*, where the bearing and fork are in close contact to prevent the bearing from tipping backward or forward. The upper surface, H, of the bearing E is made spherical concentric with the center of the bolt *g*, and the fork is provided with a spherical bearing-surface, H', resting on the spherical top H of the bearing-box E. The lug E', at the lower end of the box, is made cylindrical, as shown in Fig. 3, and provided with a central opening, I, through which the bolt *g* passes. The bolt-holes in the lug E are made flaring outwardly to permit the fork to swivel on the lug. The shoulders *h* on the bearing-box are made in the form of cylinder-segments, and the corresponding shoulders, *h'*, on the fork are made straight, as represented in Fig. 15. This construction permits the fork to turn or swivel slightly on the box without clamping the box on the balls, and the spherical top of the box permits the upper part of the fork to spring in or out, the bolt acting as a pivot. The bolt *g* is placed in front, or outside of a line drawn through the balls, as represented in Fig. 1, to bring the bolt in line with the fork and in the direction of the greatest strain.

In the construction represented in Fig. 8 the pivot I is omitted, and the same result is attained by making the bolt-hole through the lug E' flaring from the middle toward both ends. This construction is simpler than the construction represented in Figs. 2 and 3, but is liable to wear loose. The wear can, however, be compensated for by forming the flaring bolt-hole in a bushing seated in a straight opening formed through the lug E', as represented in Figs. 6 and 8, and this bushing can be renewed from time to time, as may be required.

In the construction represented in Figs. 5 and 7 the box can adjust itself on the balls in one direction only. In this construction the lug E' is made with flat sides and fits between the flat forked ends. This construction, although not as desirable as the constructions hereinbefore described, is still an improvement on the usual construction of attaching the bearing to the fork above the axle, and forms a very secure joint, which is not liable to wear loose.

It is obvious that this method of attaching the bearing to the fork is applicable to tricycles as well as bicycles.

J represents the front portion of the reach or backbone provided with the centers *j j'* in the usual manner.

K represents the steering-head, formed with

a center-bearing, *k*, in which the lower center, *j*, rests.

L represents the upper adjustable center-bearing, which rests on the upper center, *j'*. The bearing L is provided with an external screw-thread which engages in a threaded opening in the upper part of the steering-head K.

l is the oil-passage formed centrally in the bearing L above the center *j'*, and provided with a lateral branch, *l'*, which opens on one side of the bearing L.

M is a dust-cap, adapted to close the opening of the oil-duct *l'*, and provided with a screw, *m*, which screws into a threaded opening arranged in line with the oil-duct *l*. When the dust-cap M is screwed down, as represented in Fig. 9, it closes the opening of the oil-duct *l'*. By slightly unscrewing the dust-cap it uncovers the opening of the oil-duct *l'* without requiring the dust-cap to be disengaged from the bearing L, thereby avoiding the danger of losing the dust-cap.

N N represent the handle-bars, and N' the horizontal lug, to which the handle-bars are secured by screw-threaded sleeves O.

P represents a block arranged in the lug N' between the inner ends of the handle-bars N for the purpose of connecting the same. This block or bar P is provided with inclined ends *p*, which are closely drawn against the inclined ends *n* of the handle-bars by the screw-threads in the sleeves O. The latter are each provided with a right and left hand screw-thread, or with screw-threads of different pitch, as described with reference to the coupling-sleeve D, by which the cranks are attached to the axle, so that by turning the sleeves O the handle-bars are firmly drawn against the intermediate block, P, and secured in place. The sleeves O are made so light that in case of a fall they will break before the handle-bars are broken or injured, thereby saving the handle-bars and steering-head.

Q represents a polygonal or flat-sided collar formed centrally on the block P and arranged in a mortise, *q*, of the lug or sleeve N'.

R represents a wedge interposed between the collar Q and the adjustable center-bearing L, in the mortise *q*, and *r* is a set-screw whereby the wedge R is adjusted. After the center-bearing L has been adjusted to properly rest on the center *j'* the wedge R is firmly clamped against the bearing and the collar Q, thereby securing both the bearing and the handle-bars in position. This device for securing the adjustable center-bearing L dispenses with the use of an outside check-nut and permits a closer build of the steering-head.

When the handle-bars N N are formed in one piece, the flat-sided collar Q is formed directly on the handle-bars. The intermediate block, P, may be omitted and the inner ends of the handle-bars may be constructed to overlap each other and fit against the wedge R.

In the construction represented in Fig. 13 the intermediate block, P, is formed in one piece with the steering-head, and its ends are serrated or notched and fit into correspondingly serrated or notched ends of the handle-bars, the latter being connected to the serrated ends of the intermediate block by sleeves O, as above described.

S represents the brake spoon or plate, provided with a bifurcated rear end, S', which straddles the front portion of the steering-head K, and is pivoted to the sides of the latter by screws S^2. The bifurcated arms S' extend upwardly from the pivots S^2 along both sides of the steering-head, and are attached at their upper ends to the brake arm or lever T.

t represents a spring whereby the brake S is held in an elevated position. The rear end of this spring is seated in a mortise formed in the front side of the steering-head K, and its front end in a mortise on the under side of the brake-spoon S. The spring *t* is arranged between the arms of the bifurcated portion S', whereby the spring is concealed from a side view. This construction of the brake permits the brake-lever to be snugly fitted to the front end of the steering-head, and gives room for the set-screw *r*, and renders the brake more convenient and more sightly.

I claim as my invention—

1. The combination, with the axle and crank provided with interlocking parts, of a connecting-sleeve provided with differential screw-threads engaging, respectively, with the axle and crank, whereby the axle and crank are adjusted toward or from each other by turning the sleeve, substantially as set forth.

2. The combination, with the hub of a wheel, of the central part, A, of the axle secured thereto, a crank, B, provided with an end portion, *b*, which interlocks with the end *a* of the central part, A, of the axle, and a screw-sleeve, D, which embraces the interlocking ends *a b* and secures the crank to the hub and axle, substantially as set forth.

3. The combination, with the axle and crank, both provided with overlapping inclined ends, of a wedge interposed between said overlapping ends, substantially as set forth.

4. The combination, with the axle and crank, provided with overlapping inclined ends *a b*, of the interposed wedge C and screw *c*, substantially as set forth.

5. The combination, with the axle and crank, provided with overlapping inclined ends, of a wedge interposed between said overlapping ends, and a sleeve provided with differential screw-threads, whereby the axle and crank are connected together, substantially as set forth.

6. The combination, with the axle and crank, of a screw-sleeve connecting the axle with the crank, and serving to adjust the cone of the bearing, substantially as set forth.

7. The combination, with the axle and crank, of a screw-sleeve connecting the axle with the crank, and formed with a cone, a cone through which the sleeve passes, balls interposed be-

tween the cones, and a bearing-box in which the balls are contained, substantially as set forth.

8. The combination, with a bearing-box, of a fork constructed with a bifurcated lower end embracing the box, and secured to the box below the axle by a bolt passing through the box and through the jaws of the fork, substantially as set forth.

9. The combination, with the fork constructed with the bifurcated lower end, of a box arranged between the jaws of the bifurcated lower end of the fork, and attached to the fork below the axle by a swiveling connection, so that the fork can twist on the box or spring in or out at the upper end of the box, substantially as set forth.

10. The combination, with the fork, of the bearing-box pivoted at its lower end to the fork by a horizontal pivot arranged at right angles to the axle and provided at its upper end with a projection having cylindrical front and rear sides and a spherical top, which projection is seated in a correspondingly-shaped recess in the fork, whereby the fork is enabled to spring in and out on the box by turning on the lower pivot, substantially as set forth.

11. The combination, with the fork provided at its lower end with jaws F′, of the bearing-box E, provided at its upper end with a projection having cylindrical front and rear sides, having a spherical upper surface seated in a correspondingly-shaped recess in the fork, a cylindrical lug, E′, formed at the lower end of the box E and arranged between the lower ends of the jaws F′, a pivot, I, arranged in the lug E′, and a horizontal bolt, *g*, passing through the lower end of the jaws F′, lug E′, and pivot I, substantially as set forth.

12. The combination, with the upper center-bearing provided with an oil-duct opening outwardly, of a dust-cap, M, which covers the end of the center-bearing and the opening of the oil-duct in the same, and which is provided with a central screw-stem, *m*, which enters the center-bearing, substantially as set forth.

13. The combination, with a steering-head and handle-bars provided with a flat-sided block, Q, of the wedge R, whereby the handle-bars are secured in place, substantially as set forth.

14. The combination, with the steering-head and adjustable center-bearing L, of the handle-bars provided with a flat-sided part, Q, and a wedge interposed between said flat-sided part and the adjustable center-bearing, substantially as set forth.

15. The combination, with the screw-threaded handle-bar lug and the screw-threaded handle-bars, of coupling-sleeves provided with differential screw-threads engaging, respectively, with the threads of the handle-bar lug and handle-bars, whereby the handle-bars are secured to the handle-bar lug, substantially as set forth.

16. The combination, with the steering-head provided with a hollow lug or socket, N′, of the handle-bars N N, having inclined inner ends, an intermediate block having inclined outer ends, and screw-threaded sleeves O, whereby the handle-bars are secured to the steering-head, substantially as set forth.

17. The combination, with the steering-head having a hollow lug or sleeve, N′, of handle-bars N N, intermediate block, P, provided with flat-sided collar Q, screw-threaded sleeves O, and wedge R, substantially as set forth.

18. The combination, with the steering-head, of the brake S, provided with a bifurcated rear portion pivoted to opposite sides of the steering-head, substantially as set forth.

19. The combination, with the steering-head, of the brake S, having a bifurcated rear portion, S′, and a spring, *t*, arranged within the bifurcated rear portion of the brake, substantially as set forth.

20. The combination, with the steering-head and brake, of a spring seated with its rear end in a mortise in the steering-head and bearing with its front end against a depression on the under side of the brake, substantially as set forth.

EMMIT G. LATTA.

Witnesses:
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S. G. LATTA.