

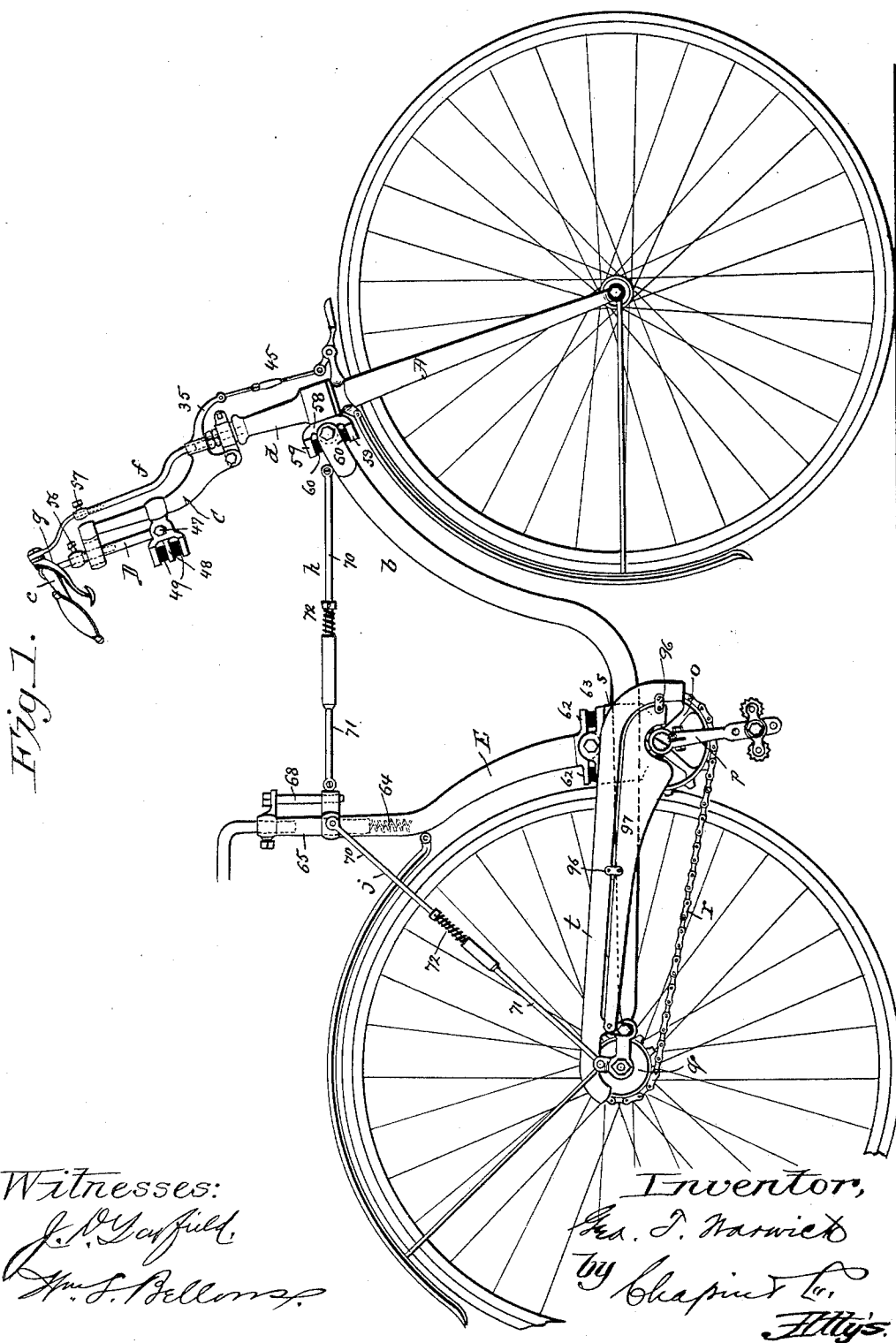
(No Model.)

4 Sheets—Sheet 1.

G. T. WARWICK.
VELOCIPED.

No. 467,695.

Patented Jan. 26, 1892.



Witnesses:
J. P. Gayfield,
Am. S. Bellows.

Inventor,
G. T. Warwick
by Chapin & Co.
Attys.

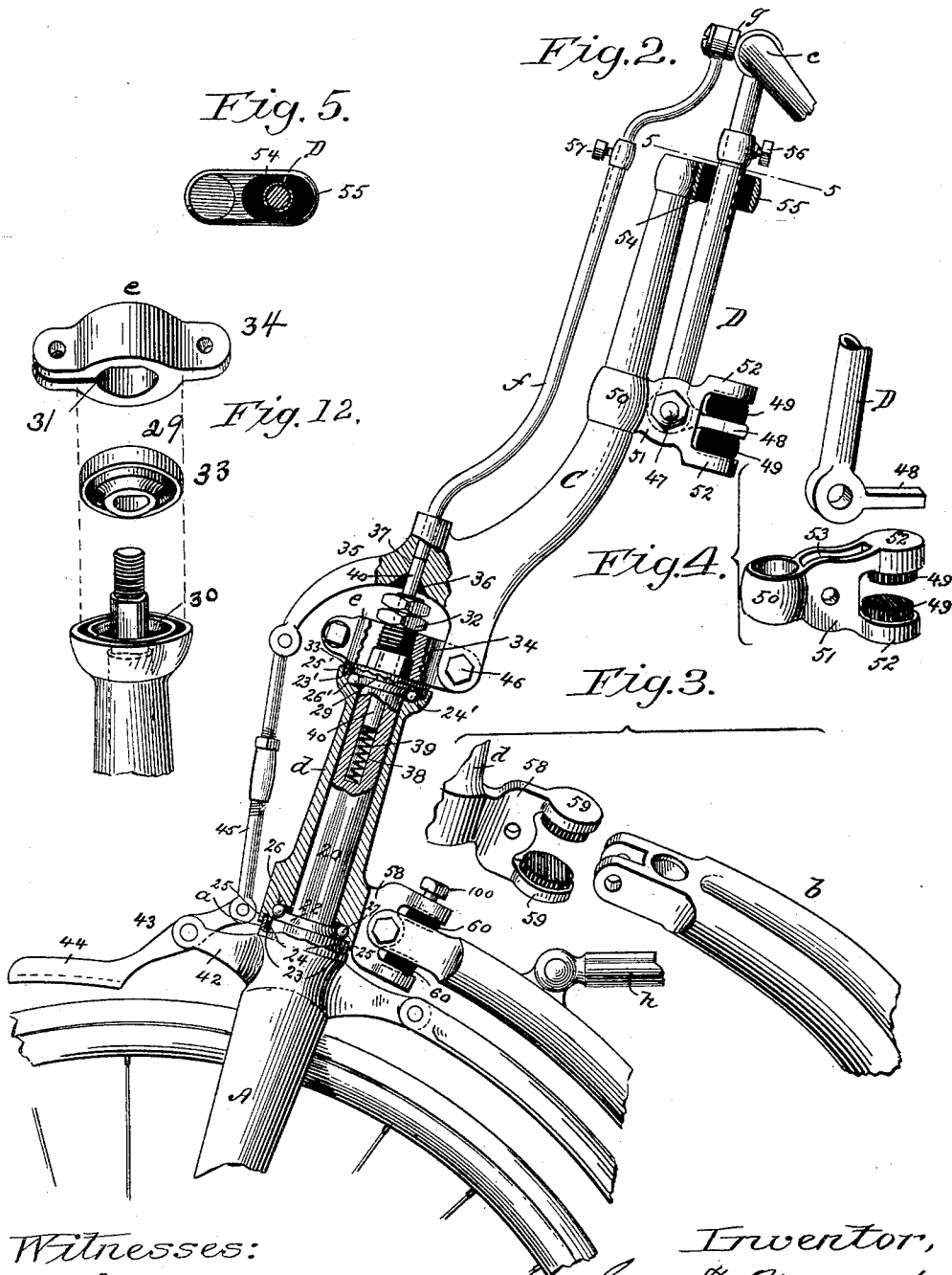
(No Model.)

4 Sheets—Sheet 2.

G. T. WARWICK.
VELOCIPEDE.

No. 467,695.

Patented Jan. 26, 1892.



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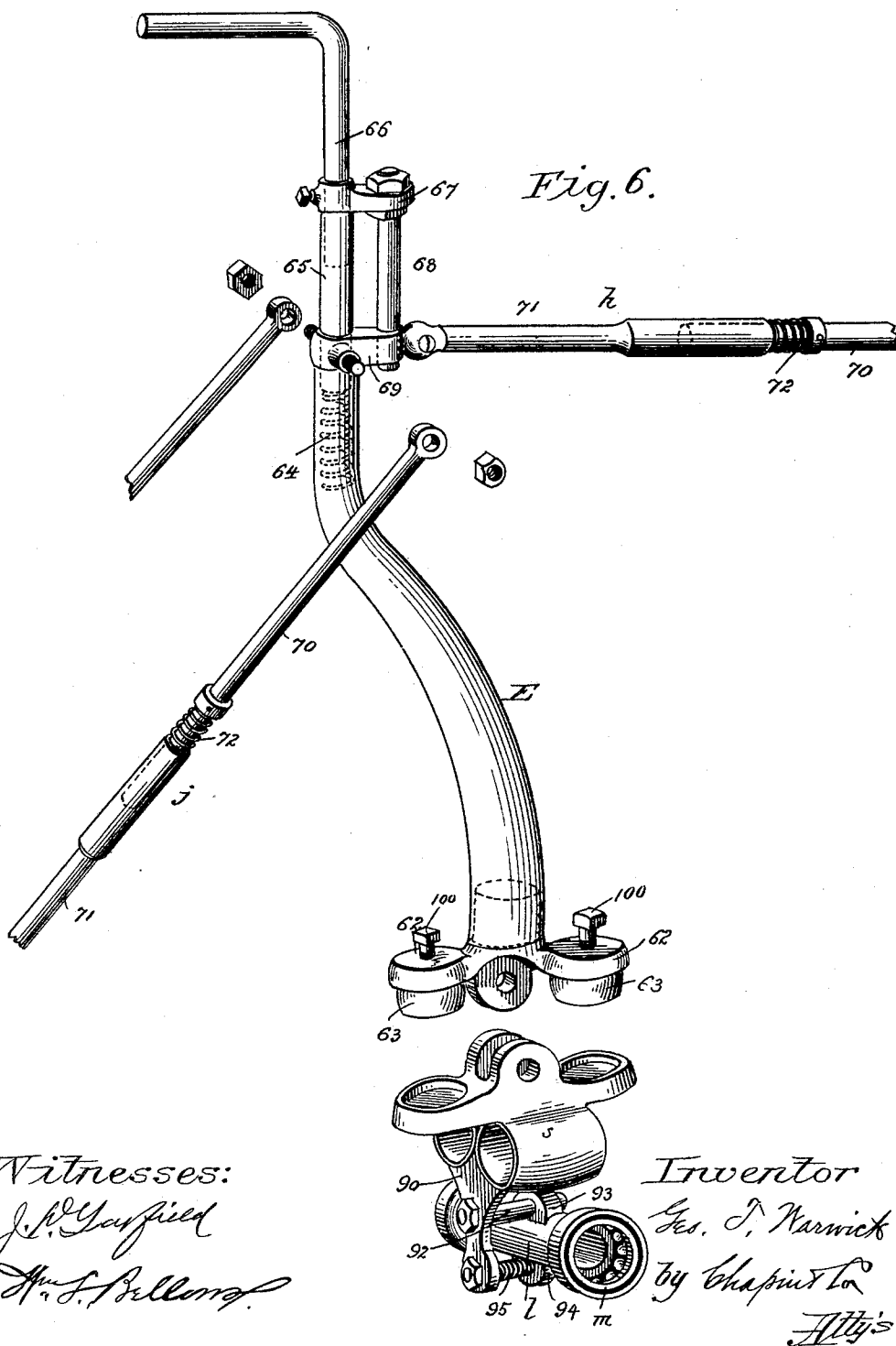
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4 Sheets—Sheet 3.

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4 Sheets—Sheet 4.

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Fig. 10.

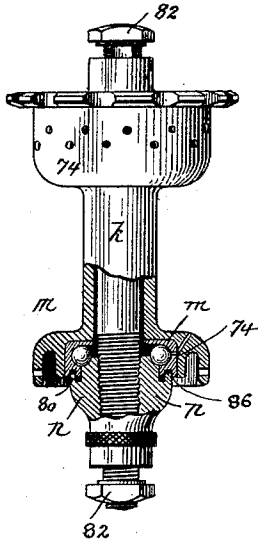


Fig. 7.

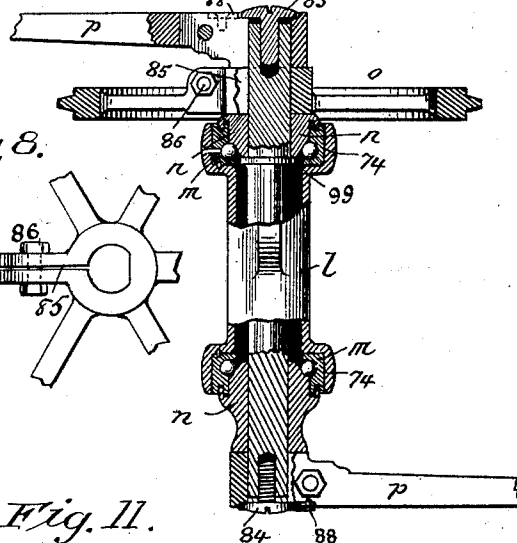


Fig. 8.

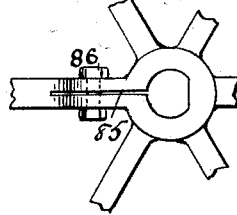


Fig. 11.

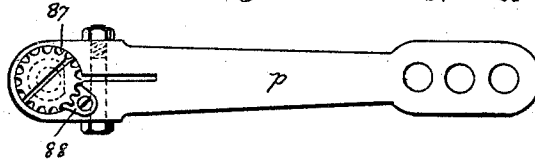
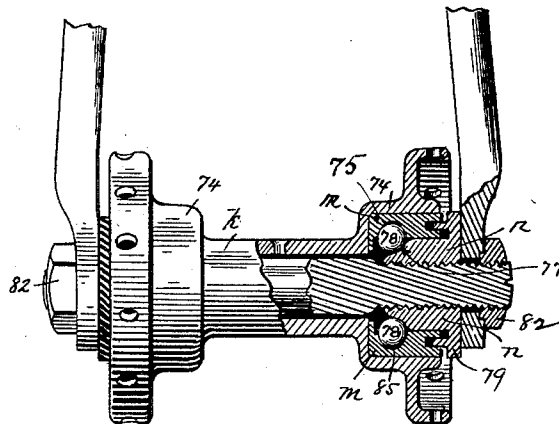


Fig. 9.



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UNITED STATES PATENT OFFICE.

GEORGE T. WARWICK, OF SPRINGFIELD, MASSACHUSETTS.

VELOCIPEDÉ.

SPECIFICATION forming part of Letters Patent No. 467,695, dated January 26, 1892.

Application filed January 23, 1890. Serial No. 337,880. (No model.)

To all whom it may concern:

Be it known that I, GEORGE T. WARWICK, a subject of the Queen of Great Britain, residing at Springfield, in the county of Hampden and State of Massachusetts, have invented new and useful Improvements in Velocipedes, of which the following is a specification.

This invention in velocipedes has for its object the improvement of the construction of vehicles of the class indicated; and it consists in the construction and combination of parts, all substantially as will hereinafter more fully appear, and be pointed out in the claims.

Reference is to be had to the accompanying drawings, in which similar characters of reference indicate corresponding parts in all the views.

Figure 1 is a side elevation of a velocipede of the kind particularly designated as a "Safety" bicycle, the same illustrating, either in whole or in part, many of the novel features constituting this invention. Fig. 2 is an enlarged side elevation of a part of the head of the machine, with some parts thereof shown in central vertical section. Fig. 3 represents in perspective a part of the frame or backbone and a part of the head with which said first-named part is connected. Fig. 4 represents in perspective a part to be secured on the steering-post and also a portion of a supplemental steering-post. Fig. 5 is a horizontal section and plan view of parts seen on and below the line 5 5, Fig. 2. Fig. 6 is a perspective view of detached parts, the principal of which are the supporting-yoke for carrying the bearing for the sprocket and crank-shaft and the saddle-post. Fig. 7 is essentially a horizontal section through the bearing for the crank and sprocket-wheel shaft and also through the pedal-cranks and sprocket-wheel which are shown as confined on said shaft. Fig. 8 is a face view of the sprocket-wheel which embodies novel features of invention. Fig. 9 is in part a front elevation and in part a central axial section of the bearing for the front wheel. Fig. 10 is in part a plan view and in part a longitudinal axial section of the bearing for the rear wheel. Fig. 11 is a face view of one of the pedal-cranks, illustrating novel improve-

ments. Fig. 12 shows a detail of the top part of the steering-head, showing the dust-guard.

The front fork A, at its portion above the rim of the front wheel, is upwardly continued in a spindle or post-like extension 20, formed on or rigidly attached to the fork proper. The base of the said fork-spindle is formed with a conical or other suitably-formed surrounding wall, as seen at 22, outside of which and at the bottom whereof is a ledge *a*, having therein an annular groove 23. To the upper and forward extremity of the backbone *b* is connected a sleeve-like or tubular extension *d*, which for the greater portion of its length loosely or freely fits the said fork-spindle 20. The said tubular backbone-extension at its bottom is provided with an annular rib 24, which is adapted to fit into the said annular groove 23 at and surrounding the base of said spindle, and outside of said annular rib 24 and slightly separated therefrom is another concentric and annular rib 25, which is adapted to lie outside of and upon the periphery of the fork-head base below the plane of the groove-ledge *a*, above mentioned. Inside of the said inner annular rib 24 is an inwardly-converging peripheral surface 26, which lies opposite to the said conical surface 22 and merges into the axial bore of the tubular extension *d*. The said surfaces 26 and 22 conduce to form an annular chamber, between the walls of which bear the hardened balls 27, comprised in the ball-bearing between the lower end of the tubular backbone-extension and the base of the fork-spindle.

The upper end of the tubular extension *d* is formed substantially the same as the lower end, already described—that is, it has the inwardly-converging peripheral surface, here denoted by 26', and the concentric annular ribs 24' and 25', between which is the annular groove 23'. After the tubular backbone-extension has been placed over the spindle 20 a collar is placed over the extremity of the spindle. The said collar (indicated by 29) has on its lower side the inwardly-converging or conical surface, similar to the surface 22 at the bottom of the spindle, and said surface, together with the one 26', form the annular chamber, the walls of which inclose and bear

upon the hardened balls therein provided. The spindle 20 is projected above the top of said collar, one side thereof being flattened, as shown at 30, and the extremity thereof is screw-threaded.

e represents a collar having a portion of its inner periphery formed full, as shown at 31, whereby a D-hole is provided through same, which is adapted to fit the flat-sided spindle extremity and to be held against any rotation, and said collar is held against any movement axially of the spindle by one or more jam or check nuts 32, which are applied upon the threaded extremity of the spindle. The bottom surface or edge of said collar is of ribbed form, as at 33, which enters the annular groove in the top of the tubular backbone - extension. The annular rib and groove engagement made between the tubular extension *d* and the ledge at the base of the spindle 20 and also the under side of said collar *e*, which has been described, constitutes a very simple yet effective guard against the entrance of dust or moisture to the ball-bearings. The said collar *e* is provided with a rearwardly-extending lug 34, to which the bottom of the steering-post C is so pivotally connected that it may have a rocking motion in a vertical plane which intersects the axis of the spindle 20. By turning the check-nut 32 downwardly, so that the collar *e* is downwardly forced, a suitable downward pressure is exerted on the said collar 29, whereby it may be placed in adjustment to properly bear upon the balls thereunder. The steering-post C a short distance above the top of the collar *e* has a rigid forward extension or arm 35, which projects to the front of the head of the machine, and in the under side of the portion of said arm which is normally over the axis of the spindle 20 is formed a chamber of conical or other suitable shape, as shown at 36, which is upwardly continued through the thickness of said arm 35 in a bore or opening 37 of even diameter. The said fork-spindle 20 for the upper portion of its length is axially bored or socketed, as at 38, in the bottom of which is a spiral spring 39, which supports a pin or plunger-rod 40, the upper end of which projects upwardly beyond the conical opening 36 and to some extent into the straight bore 37, the upper end of said plunger-rod, however, terminating some distance below the upper end opening of said bore 37.

f represents a vertically-disposed and vertically-movable plunger or thrust-rod, the upper end of which is connected to the brake-operating lever *g*, which is pivoted on the handle-bar *c*, and the lower end of said rod *f* enters and is adapted to play vertically in the said bore 37 and against the end of the said plunger 40.

42 represents an arm projected forwardly from the front fork, below the base of the spindle 20, and to said arm 42 the lever 43 is intermediately pivoted, the lower arm of which

lever constitutes the brake-shoe 44, while to the upper and rearward arm of said brake-lever the lower end of a link or connecting-rod 45 is attached, the upper end of said connecting-rod 45 being secured to the extremity of the said arm 35, formed on the steering-post. By securing through a swinging movement of the brake-operating lever *g* a downward movement of the thrust-rod *f* the plunger 40 is downwardly forced against its spring 39, so that the upper end of said plunger lies within the conical chamber 36, and then on swinging the steering-post rearwardly from its pivotal point 46, raising the arm 35, the upper and rearward arm of the brake-lever 43 is raised and the shoe end 44 of said lever is swung downwardly to bearing upon the tire of the front wheel. After the brake has been applied for as long a period as desired on swinging the post C forwardly the brake-shoe is caused to be removed from its operative action on the tire, and when the axis of the chamber 36 and bore 37 in the steering-post extension is brought coincident with the axis of the plunger 40 the same is, under the recoil of its spring, forced upwardly into a locking engagement by its entrance into the said bore 37, the thrust-rod *f* at such time, through the proper swinging of the brake-operating lever *g*, being in its uppermost disposition, so as to afford no obstruction to the return of the plunger 40 to its locking engagement. By providing the enlargement 36 at the end of bore 37 under arm 35 the post may on quite a slight depression of the plunger be swung, and the inclined walls are acted on by the plunger for a guiding action on the return of the plunger into said bore.

It will here be observed that the collar *e*, being held against rotation and also against axial movement with relation to the front fork A by the connections described with the fork-spindle 20 and the steering-post C, connected, as at 46, to the collar *e* and capable of being locked by the plunger 40, as described, said steering-post is, except when it is desired to operate the brake, in substance a rigid vertical extension of the front fork A, and the provision of swinging capabilities in the steering-post is solely and entirely to constitute in the same a medium for operating the brake, as described.

D represents another or supplemental steering-post, on which the handle-bar *c* is carried. The said supplemental steering-post has a swinging motion forward and backward on and with relation to the front fork A. The connection of the said supplemental steering-post D with the part C of the fork consists in pivoting the said steering-post D on the part C, as at 47. The supplemental steering-post D is provided with an angularly-extending arm 48, above and below which are applied cushions or springs 49 49, which bear between the upper and lower sides of said arm 48 and suitable abutments or extensions on the supporting part C of the front fork. A specific

approved device for employment in making the pivotal connection between the parts D and C is shown in Figs. 1, 2, and 4 of the drawings, and mainly consists in the encircling strap or ring 50, which surrounds the part C at a considerable distance below its upper end, and the radial extension 51, terminating in the separated upper and lower lugs 52 52. The said radial extension 51 is chambered from its rear edge, as at 53, within which the elbow of the supplemental steering-post D is disposed, the pivot bolt or pin passing transversely through the walls of said extension 51 and the said elbow. The said lugs 52 are slightly recessed on their inner sides, whereby the springs or cushions 49 are the better retained in place. An arm or lug 54, which is rigidly attached to the upper end of the part C, extends by the portion 55 rearwardly from said upper end and has an opening through it from top to bottom, through which the steering-post D passes, there being interposed between the inner walls of said apertured part 55 and said post D a rubber bushing-sleeve or other form of spring-cushioning device. The purpose of providing the angular arm 48 on the post D, pivot connecting said post on the extension of the front fork, applying the spring-cushions to bear upon the said arm 48, and also providing a yielding contact-support to an intermediate part of said post D is to minimize the vibration in the steering-post D and handle-bar c. As well known, especially to velocipede-riders, the effect of the vibration of the handle-bar, as well as of the saddle-post and saddle, constitutes a serious objection to long-continued riding, and it is the aim of the present invention to effect among other improvements a reduction in a large degree of the capabilities for vibration, as above stated. The handle-bar post D is formed in two sections, as indicated in Figs. 1 and 2, whereby the handle-bar may be adjusted vertically, the set-screw 56 confining the one part upon the other when said parts have been properly adjusted, and in order that such adjustment of the handle-bar may be permitted without rendering inoperative the locking devices for the parts C and the brake-operating connections the said thrust-rod *f* is similarly made telescoping or extensible, the one section thereof being confined upon the other by the set-screw 57.

The backbone *b* is peculiarly connected to the tubular backbone-extension *d* and spring supported or cushioned thereon, whereby any vibration which may be occasioned in the front wheel or head of the machine will not be imparted to the rear part of the machine. The base of the tubular backbone-extension *d* is provided with a rearwardly-extending lug 58, to which the backbone proper is, by its forward end, pivotally connected, whereby it may have a swinging motion vertically on the extension *d*. Said lug 58 has upper and lower rearward extensions 59, between which

and the upper and lower sides of the backbone are interposed cushions or springs 60. A substantially similar provision is made in the connection of the saddle-post E with the frame, whereby shocks and vibrations which may be imparted to the frame either from the front wheel or the rear wheel may not be imparted in any material degree to the said saddle-post. The said saddle-post at its lower end is pivotally connected to the frame or to some rigid attachment thereof, and above and forwardly and rearwardly of the said pivotal point the saddle-post is provided with the rigid arms or angular extensions 62, between the underside of each of which and the frame is interposed a spring-cushion 63. The upper portion of the saddle-post E is formed tubular or socketed, in the base of which socket is placed a spiral spring 64.

65 represents a spindle, which enters this socket in the said post E vertically and rests by its lower end upon the said spring 64 and on said spindle 65 or to any supplemental equipment thereof, as the adjustable arm 66, the saddle is to be supported. The said spindle 65 is provided with a radial arm 67, which rigidly carries at its end a vertical stud 68, which passes downwardly through a guiding-socket in a rigid radial arm fixed on the upper end of the said post E. By this means the saddle-supporting spindle 65 is prevented from any rotational movement. A stay-rod *h* is connected to the upper forward end of the backbone and to the upper extremity of the saddle-post E, and another stay-rod *j* is connected at each side of the machine to the upper end of the saddle-post E and to the rear wheel-bearing. Each of the stay-rods *h* and *j* is formed in two sections or members 70 and 71, the one adapted to telescope the other, and a spring 72 is applied for an engagement between and for a spring-forcing action upon said members 70 and 71. The said stay-rods *h* and *j*, while they serve as brace-supports for the upper end of the saddle-post and have telescoping capabilities whereby the saddle-post may swing against the yielding resistance afforded by the cushions 63, also act as spring-cushions interposed between the forward and rearward extremities of the frame and the top of the saddle-post, whereby any vibration or shocks which would be likely to be imparted to the upper end of the saddle-post through said stay-rods become reduced to practically nothing.

In the velocipede shown in the drawings there are three parts of or kindred to the frame, which, as has been described, are jointed peculiarly and in a novel manner—that is, the handle-bar post D and the post-like part C, the head and the backbone, and the frame and the saddle-post each have connections between said respective couples of parts, which consist in the one part being pivotally connected to its fellow part and one or more spring-cushions so applied between the said parts whereby a yielding resistance

is exerted against the swinging movement of the one part upon the other. It is deemed advantageous to combine with the said so pivoted and cushioned parts means whereby the degree of spring reaction may be modified and whereby the amount of swinging movement may be limited.

One means for securing the result above described is illustrated in the view, Fig. 6, wherein set-screws 100 100 are shown as screwing through the thickness of the angular extensions on the one part (here the extensions being those 62 of the saddle-post) to a bearing by their extremities on the said cushion to contract same. By projecting the said screws inwardly through the one part whereby its extremity is nearer to the surface of the other part there will be permitted a less degree of movement of the swinging part. Thus it will be seen that the fulcrumed swinging and cushioned members may be so adjusted as to render the machine adaptable for use by riders of varying weights and those having different preferences as to the extent of swinging movement that the said jointed parts may possess.

I will now describe an improved ball-bearing which is embodied in various parts of the machine, the same being illustrated in Figs. 7, 9, and 10, the bearing in Fig. 7 being the crank-shaft and sprocket-wheel bearing, in Fig. 9 the front-wheel bearing, and in Fig. 10 the rear-wheel bearing. In the front and rear wheel bearings the shaft is held against rotation, the sleeves *k* constituting the wheel-hubs, while the sleeve *l* (shown in Fig. 7 and also in Fig. 6) is rigidly though adjustably supported from the intermediate portion of the frame of the machine, the crank-shaft freely rotating within said sleeve *l*. Each sleeve is provided at its ends with enlarged cup-shaped sockets 74, in each of which is placed a hardened ring *m*, the outer periphery of which closely fits the said sleeve-socket, and there is formed in the inner periphery of the ring *m* an annular groove 75, of semicircular or other suitable transverse contour. In the bearings this ring *m* may either be fixed against rotation in its socket 74 or it may be free to freely rotate in said socket.

n represents a collar, which is placed upon the shaft, being adapted for adjustment longitudinally thereof, and a portion of said collar enters between the inner periphery of the ring *m* and the shaft, and its extremity, which terminates opposite and inside of the said annular ring-groove 75, is suitably formed by having its surface inclined or grooved, as at 77, to constitute a peripheral bearing-surface for the hardened balls 78, the opposite wall or bearing-surface for said balls being constituted by the said annular groove 75. The outer end of the collar is extended in the surrounding flange 79, so as to lie opposite to the outer end of the ring *m*, and there is essentially a rib-and-groove engagement between the end face of the ring *m*

and the inner face of the said flange 79. As particularly shown in the drawings, there is an annular groove or rabbet sunk into the outer end of the ring *m*, the annular groove 80 being formed in the collar *n*, and of course the relations of these parts may be reversed without affecting the efficiency of the dust-guard, which is constituted by the rib-and-groove engagement of the adjacent portions of the ring and collar. In the bearing, when such an application thereof is made as is shown in Figs. 9 and 10, where the shaft does not rotate, the collar *n* is normally held against rotation on the shaft, and is adjustable longitudinally thereon by the screw-thread engagement which it has therewith, and the fork-legs are confined in place on the extremities of their respective shafts by the nuts 82. In Fig. 7, where the shaft is shown as rotatable, the collars *n* are free to move longitudinally on the shaft and upon one outwardly-extended extremity of the shaft, beyond the one collar *n* thereon, is placed next to the end of the collar a primary sprocket-wheel *o*, against and outside of which and about the shaft is placed the hub of one of the pedal-cranks *p*, said pedal-crank being held against outward movement, as well, also, as the said sprocket-wheel *o*, by the screw 83, the shank of which enters the extremity of the shaft and the head of which overlies the outer face of the crank-hub. Upon the other end of the shaft the other pedal-crank is placed, and is held in place by the screw 84, which by its shank axially enters the threaded bore in the end of the shaft, the head of the screw bearing upon the outer face of the crank-hub. By turning the said screw 84 inwardly the hub of the crank acted on thereby is forced inwardly along the shaft and against the adjacent collar *n*, forcing said collar inwardly to its proper adjustment for its most efficient bearing upon the hardened balls, and the sleeve at such time has imparted thereto an endwise movement toward the other crank, so that the ring *m* in the end of the sleeve nearer said latter-named crank forces the balls inclosed therein to the proper bearing against the inner end of the adjacent collar *n*.

It will be plain from the description hereinabove given that this form of ball-bearing is of the utmost simplicity, being constituted by a very few inexpensive and easily-constructed parts, is most easy and simple of adjustment, and is capable of practically excluding all dust and moisture from entrance to the hardened balls and inclosing chamber therefor.

In constructing the duplex ball-bearing for a shaft it is preferred to form near one end of the shaft the shoulder 99 as a positive stop for one collar *n*, the forcing movements of the other collar effecting the adjustment; but this provision is not absolutely essential.

The sprocket-wheel, as well as the crank, is secured on the shaft against rotation by

forming a portion of the shaft flat and employing the well-known mechanical expedient of a **D**-hole through the hub of the sprocket-wheel and the crank-hub, and in order that there may be no lash or slack between the said openings or **D**-holes and the periphery of the shaft the sprocket-wheel is provided with a slit or kerf 85, which extends from the periphery of its hub-hole radially within one of the spokes of the wheel for a suitable distance, substantially as shown in Fig. 8. A bolt or contracting-screw 86 passes laterally through the spoke across the said kerf 85. By properly turning the said screw 86 the stock or metal at each side of said kerf is drawn toward the center thereof and the opening through the hub is slightly contracted, and yet sufficiently to secure a close connection thereof upon the shaft. The hub of the crank is shown as similarly adapted by the kerf and contracting-screw to be closely confined upon the shaft. In lieu of making a **D** engagement between the hub and shaft a key may be used.

A device is employed for confining the screw 83 against loosening and disengagement from its connection with the shaft, which consists as follows: The head of the screw has its edge serrated, as seen at 87 in Fig. 11. A dog 88 is provided, which is secured by a screw to the face of the crank-hub and is at its extremity also serrated to engage the notched rim of the screw.

In Fig. 6 is illustrated a means for adjusting the sleeve *l*, which carries the shaft for the pedal-cranks and the primary sprocket-wheel *o*, whereby in its movement toward the front of the machine and at right angles to its axis the sprocket-wheel *o*, carried thereon, may be so separated from the rear sprocket-wheel *q* as to take up any undue slack which there may be in the sprocket-chain *r*. The yoke *s*, which surrounds the intermediate portion of the frame, is provided with a downwardly-extending lug 90, provided with a rigid horizontal pin 92, which extends longitudinally of the machine. On the said sleeve *l* is an ear-piece 93, apertured to fit for a sliding bearing on said pin 92. Said sleeve is also provided with another lug 94, with which screw engages the screw 95, which is supported for rotation, but against any axial movement, in a suitable bearing-aperture in the said pending lug 90 of the yoke.

An improved form of trousers or clothes guard is illustrated in Fig. 1 in connection with the usual mud-guard *t*, which is supported from the frame above the chain *r*. Said clothes-guard consists of a sheet-metal plate 97, having considerable transverse or vertical area at its portion adjacent the sprocket-wheel *o*, so as to cover—that is, to lie outside of—the upper portion of said sprocket-wheel and the upper part of the chain. Said clothes-guard, in lieu of being laid by its edge over and upon the edge of the mud-guard for the entire length of said

clothes-guard, is by its edge slightly separated from the edge of the mud-guard, being supported at a few points, as at 96, by the ear-pieces, which extend between the clothes and mud guards. By thus forming a few points of connection or contact of the clothes-guard upon the mud-guard there is a much less degree of vibration and resonance or rattling between the said parts.

What I claim as my invention is—

1. The combination, with the front fork having a suitable upward extension provided with upper and lower separated radial lugs 52 52, of the steering-post **D**, pivoted to said extension and having the angular arm extending therefrom between said lugs, and springs or cushions interposed between said arm and said lugs.

2. The combination, with the front fork provided with a suitable upward extension having thereon an angularly-extending apertured member, as 54, of a handle-bar or steering-post pivotally connected to a suitable part of said fork and provided with an angular arm, springs or cushions supported from said fork and bearing upon said arm above and below the same, and a cushion supported in the aperture of the above-named member and bearing transversely upon the said steering-post, substantially as described.

3. The combination, with the front fork having a brake device thereon, of a post carrying the handle-bar, pivotally connected to a part of said front fork, whereby it may be swung in a vertical plane thereon, and a connection between said pivoted post and said brake device, whereby when said post is swung the brake will be operated, and a device applied for operation on and between said fork and post and operative independently of the brake for rigidly locking said post against swinging movement with relation to the front fork, for the purpose set forth.

4. The combination, with the front fork provided with the upwardly-extended spindle 20, having the axial socket in its upper portion, of the post **C**, pivoted on said spindle and adapted to be swung thereon and provided with a forwardly-extending arm 35, having a vertical bore therethrough which is normally coincident with said socket, a plunger-rod 40, movable in said socket and upwardly spring-pressed to have an interlocking engagement with the bore in said arm, appliances for forcing said plunger downwardly out of such engagement, a brake device supported on a part of the front fork, and a connection between the said brake device and the arm of said post, substantially as and for the purpose described.

5. The combination, with the axially-socketed fork-spindle, of the post **C**, pivotally connected and supported thereon, of the arm 35, provided with the vertical bore 37, having the enlargement at its lower portion, the plunger-rod 40, movable in said spindle-socket, and the supporting-spring 38 therefor, said rod be-

ing adapted to be forced to an engagement into said bore 37, and the thrust-rod *f*, also entering the upper portion of said bore 37 and adapted to bear on and force said plunger downwardly, whereby the upper end thereof will be disposed in said chambered part 36 of said bore, for the purpose set forth.

6. In a velocipede, the combination, with the front fork, of a backbone formed of two members pivoted together, whereby the one may swing vertically upon the other and one of said members connected to the front fork, and springs or cushions applied between extensions of one member and the other member, which bear upon said latter member respectively upwardly and downwardly, for the purpose set forth.

7. The combination, with the fork provided with an upward extension, of the backbone comprising, first, a part rotatable on said fork-extension and provided with the rearwardly-extended projections or lugs 59 59, and, secondly, the backbone proper *b*, extended by its extremity between said projections and pivoted to said first-named member to swing vertically thereon, and springs or cushions between said upper and lower projections and the upper and lower sides of said backbone proper, substantially as described.

8. In a velocipede, the combination, with the frame of the machine and a saddle-post pivotally connected and supported thereon, of cushions acting between said saddle-post and frame adjacent said pivotal connection, and a stay or brace appliance connected to an upper portion of the saddle-post and suitably to the frame, comprising movable spring-constrained members operative on said saddle-post, whereby the latter is normally maintained in a position intermediate of its limits of swinging movement.

9. In a velocipede, the combination, with the frame comprising the backbone and adapted to support the rear wheel, of a saddle-post pivotally connected and supported on the frame, cushions acting between said saddle-post and the frame adjacent said pivotal connection, and a pair of stay or brace rods *h* and *j*, each comprising two longitudinally-movable members and a spring for forcing same outwardly in relation to each other, and each of said rods by its one end connected to an upper portion of the saddle-post and the other end of one connected to a part of the frame forward of the post and the other end of the second rod connected to the frame at the rear of said post, substantially as described.

10. In a velocipede, the combination, with the frame and a saddle-post supported and

pivotally connected thereon, provided adjacent its point of connection with radial extensions 62, of the cushions 63, interposed between said extensions and the frame, substantially as described.

11. In a velocipede, the combination, with the frame having the pending ear-piece, of the bearing-sleeve for the crank and sprocket-wheel shaft, a screw 95, rotatable in said ear-piece of the frame and having an engagement with said bearing-sleeve, and means, substantially such as the pin 92, engaging with an aperture in the bearing-sleeve, all whereby when the screw is turned the sleeve will be moved longitudinally of the frame and constrained for its proper movement by said engaging-pin 92, for the purpose set forth.

12. In a ball-bearing, the combination, with a shaft or spindle and a sleeve surrounding same provided with a socket in its end, a ring within said socket provided with a suitable internal peripheral ball-bearing surface, and a collar longitudinally adjustable upon said shaft, having its inner extremity formed to lie within and opposite the said peripheral bearing-surface of said ring and having its inner extremity adapted to also form a peripheral ball-bearing surface, said collar adjacent to but outside of the end of said ring being laterally enlarged or flanged to overlie said ring end, the adjacent surfaces of said ring-and-collar enlargement being formed for a rib-and-groove engagement, substantially as described, and the balls inclosed within the annular space formed by and between the said peripheral bearing-surfaces of said ring and collar, substantially as and for the purpose described.

13. The combination, with the crank-shaft, of the pedal-crank fitting on the end thereof, a screw by its shank axially entering the shaft and having its head which overlies the outer surface of the crank-hub provided with the series of notches, and a dog adapted to be secured upon the face of the crank-hub and adapted to engage the notches in said screw-head.

14. In a velocipede comprising a sprocket driving-chain and a mud-guard over said chain, the combination, with such mud-guard, of a clothes-guard consisting of a suitable plate-like part and several lugs for connecting said mud and clothes guards with a slight degree of separation, substantially as and for the purpose set forth.

GEO. T. WARWICK.

Witnesses:

WM. S. BELLOWS,
G. M. CHAMBERLAIN.