

C. L. TRAVIS, DEC'D.
A. E. TRAVIS, ADMINISTRATRIX.
BICYCLE.

NO MODEL.

APPLICATION FILED DEC. 26, 1901.

2 SHEETS—SHEET 1.

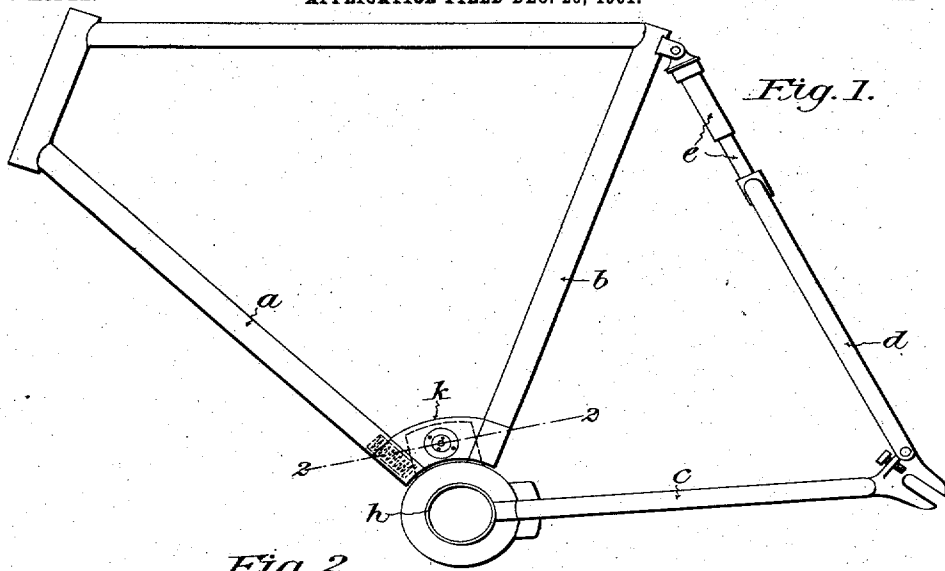


Fig. 2.

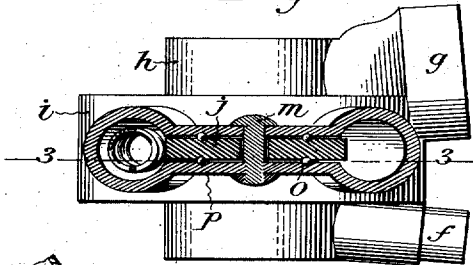
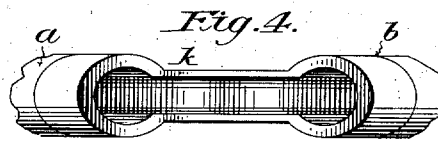


Fig. 4.

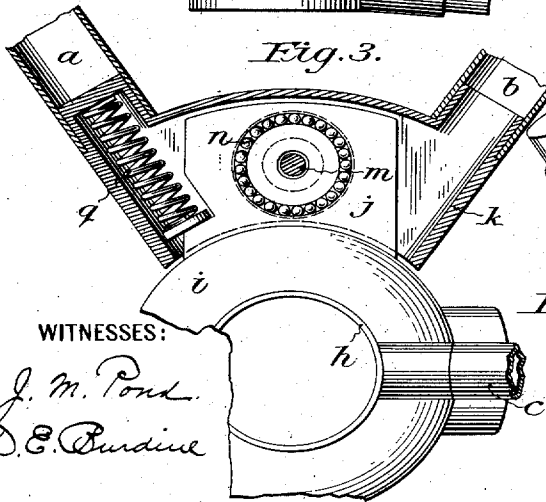


Fig. 3.

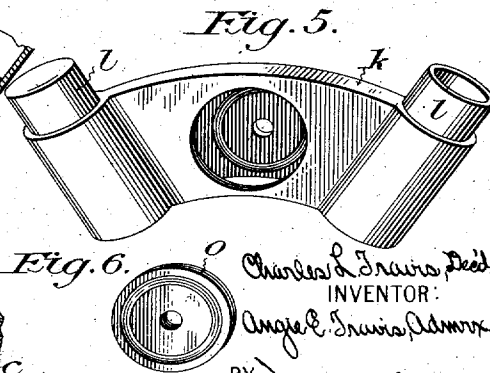
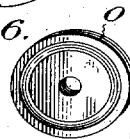


Fig. 5.

Fig. 6.



WITNESSES:

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INVENTOR:

Angela E. Travis, Adminr.

BY *W. D. Jones*
ATTORNEYS.

No. 739,237.

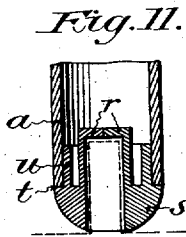
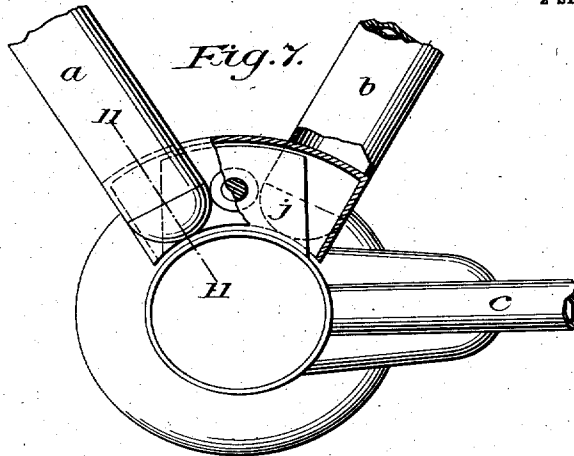
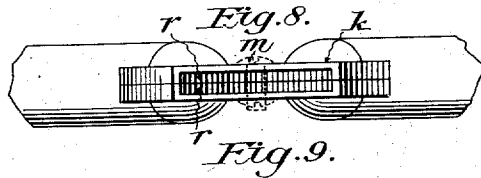
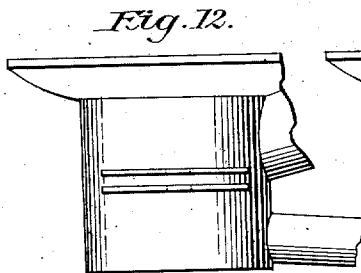
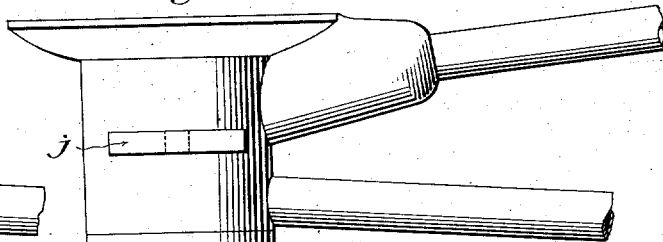
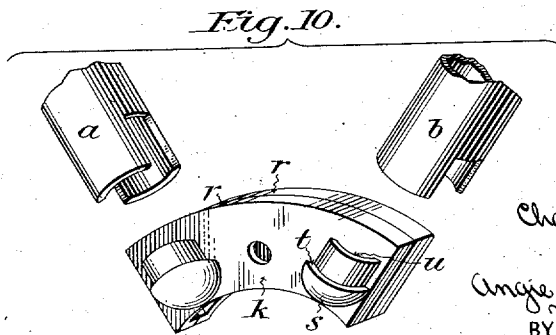
PATENTED SEPT. 15, 1903.

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BICYCLE.

APPLICATION FILED DEC. 26, 1901.

2 SHEETS—SHEET 2.

NO MODEL.



WITNESSES:

J. M. Pond.
D. E. Burdine

Charles L. Travis, Dec'd
INVENTOR:

Ange E. Travis, Adminx,
BY Dodge and Sons,

ATTORNEYS.

UNITED STATES PATENT OFFICE.

ANGIE E. TRAVIS, OF SPRINGFIELD, MASSACHUSETTS, ADMINISTRATRIX OF
CHARLES L. TRAVIS, DECEASED.

BICYCLE.

SPECIFICATION forming part of Letters Patent No. 739,237, dated September 15, 1903.

Original application filed January 28, 1901, Serial No. 44,981. Divided and this application filed December 26, 1901. Serial No. 87,276. (No model.)

To all whom it may concern:

Be it known that CHARLES L. TRAVIS, deceased, late a resident of Springfield, in the county of Hampden and State of Massachusetts, did invent certain new and useful improvements in Bicycles, of which the following is a specification.

This invention relates to bicycle-frame construction, and pertains particularly to the construction of that type known as "cushion-frames." As is well known, this particular type of frame is constructed with a telescoping rear vertical brace having a spring or pneumatic cushion interposed between its ends. This construction of rear vertical brace necessitates the provision of means for pivotally supporting the horizontal rear-wheel fork at the crank-hanger. Heretofore this has been done by hinging the ends of the fork, one at each end of the crank-hanger, in a number of different ways. These forms of construction have, however, proven unsatisfactory, mainly because of a lack of sufficient lateral rigidity, as it is obvious that the rear fork, whose separate ends are pivotally connected to the crank-hanger, will not possess the stiffness of a fork whose ends are united by a member which forms an integral part of the fork.

The object of this invention is to provide a construction in which the objections above referred to are entirely overcome, a further object being to construct a frame from which the rear-wheel fork, the crank-hanger, and the vertical rear-wheel brace may be removed, whereby the length of a bicycle when packed for shipment may be very greatly reduced.

The invention consists in the construction described in the following specification, and pointed out in the claims.

In the drawings the invention has been shown as applied to the so-called "chainless" type of bicycle-frame; but obviously it is equally applicable to the ordinary chain-driven machine.

Figure 1 is a side elevation of a cushion-frame embodying the invention. Fig. 2 is a cross-section taken on the line 2 2 of Fig. 1, this figure and the following figure being

shown on a much larger scale than Fig. 1. Fig. 3 is a side elevation of a crank-hanger and certain parts of the frame contiguous thereto, the latter being shown in section on line 3 3, Fig. 2. Fig. 4 is a plan view of the under side of a member which unites two members of the frame to the crank-hanger. Fig. 5 is a perspective view of said frame-uniting member. Fig. 6 is a perspective view of a cap for closing an opening in said frame-uniting member. Fig. 7 is a side elevation of a crank-hanger and adjacent frame parts, partly in section, showing a construction which is a modification of that shown in the preceding figures. Fig. 8 is a plan view of the same, showing the under side of a member which unites the ends of two of the frame members of the crank-hanger. Fig. 9 is a top plan view of the crank-hanger. Fig. 10 represents the frame-uniting member and two ends of the frame members in separated relations to more clearly illustrate the manner of assembling the parts. Fig. 11 is a vertical section on the line 11 11 looking either toward or from the observer, and Fig. 12 is a plan view of a modification.

The drawings from Figs. 1 to 6, inclusive, show the application of the invention to a machine driven from a gear located centrally of the crank-hanger, and Figs. 7 to 11, inclusive, show the invention applied to a machine driven from a gear located in the side of the crank-hanger. This arrangement is devoid of any special significance, as the construction shown on the center drive is equally applicable to the side drive, and vice versa.

Referring to the drawings, Fig. 1 represents an ordinary type of a cushion-frame with the exception of the construction of that portion thereof located at the crank-hanger. As ordinarily constructed the frame members *a* and *b* are united with the crank-hanger substantially in the position shown by being brazed to projections thereon or in a number of other ways, and, as stated above, the rear fork *c* is ordinarily hinged to the crank-hanger in some manner whereby when the rear brace *d* is shortened and lengthened by reason of the movement of the telescoping members *e* the rear fork *c* and the rear wheel may have more

or less movement in a vertical plane. The disadvantages of this construction have already been spoken of, and they are obviated in the present invention, in which said rear fork is secured rigidly to the crank-hanger by being brazed or otherwise secured to the projections *f* and *g*. With these ends of the rear fork thus united when the rear-wheel axle is secured in the rear end of the fork, the latter being tied together rigidly at both ends, an exceedingly stiff brace is formed and one well adapted to withstand lateral as well as vertical strains. In frames adapted to the center-driving type the crank-hanger (indicated by *h*) is constructed with a central gear-receiving chamber *i*, and on the upper side of this chamber is located a blade *j* about centrally between the ends of the crank-hanger and vertically at right angles with the axis thereof.

The lower ends of the members *a* and *b* of the frame are united by a hollow bridge-piece *k*. (Shown in perspective in Fig. 5.) This may be made of any suitable metal, as malleable iron, or it may be forged, as desired. Said bridge-piece is provided with suitable enlargements *l* at each end thereof, to which the members *a* and *b* may be secured by brazing or otherwise. Said bridge-piece *k* is preferably curved to conform to the general outline of the crank-hanger *h* and is chambered to receive the blade *j*. Said blade after being fitted in said chamber is secured therein by a bolt *m*, passing through from one side of the chamber to the other, having a jam-nut on the opposite end. This screw forms the pivot on which the rear fork and the attached crank-hanger may swing in a vertical plane. The sides of the blade and the side walls of the chamber within the piece *k*, which receives the blade, are made to fit closely, whereby while an oscillatory movement of the blade on its pivot within the chamber is easily effected there can be no rocking movement laterally of the crank-hanger relative to the frame. Said parts by reason of the above-described closely-fitting blade form a rigid structure as far as lateral strains are concerned, but one in which movements in the plane of the frame are permitted to the members *d* and *e* thereof to a greater or less extent.

Another important advantage derived from the above construction lies in the fact that by removing the bolt *m* and disconnecting the upper end of the member *d* of the frame the rear wheel and all parts of the propelling mechanism may be removed from the frame without disturbing the adjustment of said propelling mechanism in any way. Thus the length of a machine may be reduced by about fifty per cent., rendering such machine very portable as compared with a machine boxed or crated in the usual manner. This "take-down" characteristic of a gear-driven bicycle is possible only because of the rigid connection between the rear-wheel fork and the

crank-hanger, whereby the cranks and their driving connection with the rear wheel may be bodily removed from the frame of the machine and replaced again without altering the adjustment of said driving connections. This is a very important feature.

Instead of constructing the blade *j* to fit the walls of the bridge-piece *k* accurately enough space may be left between the walls of the blade and the chamber to receive on each side of the blade a row of steel balls *n*, whereby the relative movements of the blade within said bridge-piece *k* may be made as easy as possible. These balls are on one side of the chamber, located in rings concentric in the pivotal connection *o* and between the blade and the wall of said chamber and on the opposite side of the blade in similarly-located grooves, one in the side of the blade and the other in an annular nut *p* (shown in Figs. 2 and 6) and which is screwed into a suitable threaded opening in the side of the bridge-piece *k*, concentric with the pivot *o*. This annular nut may be screwed up by a spanner to take up any lateral play which may be found between the blade and the interior walls of the chamber.

The bolt *m* after passing through one wall of the bridge-piece *k* and the blade *j* screws through the center of the annular nut *p*, and a jam-nut on the bolt *m* serves as a check-nut for said annular nut as well as for said bolt.

The movement of the blade *j* relative to the bridge-piece *k* is comparatively slight, and these ball-bearings may be omitted, if desired.

To prevent the rattling or jumping of the parts constituting the loose members or movable members of the frame, one edge of the blade *j*, as shown in Fig. 3, may be notched to receive a spring *q*, located in one of the projections at the end of the bridge-piece *k* and bearing against the closed end of said projection and against the blade *j*. This spring *q* is located forward of the axis of the rear-wheel fork *c* and is so located that it may force the rear end thereof upward, and thus hold the telescoping parts *e* of the rear brace in contact with the ends of the usual spring with which said parts are provided.

To the end that the crank-hanger *h* may swing freely, it will be observed by reference to Fig. 3 of the drawings that the bridge-piece *k* when in operative position does not at its lower edge come quite into touch with the surface of the chamber *i* of said hanger and that the upper part of the blade is also free from contact with the upper part of the chamber within said bridge-piece.

It is apparent in the above construction that a change of endwise dimension in the rear brace *d*, as described, will produce an oscillatory motion of the crank-hanger about the pivotal connection *o*, extending through the blade *j* and the bridge-piece *k*. Thus all

parts of the driving mechanism supported in the crank-hanger *h* and on the rear fork *c* will move as one piece.

Obviously the pivotal connection *o* must bear the thrust of the rider's feet on the crank of the propelling mechanism; but it does not bear to any great extent, owing to the truss shape of the frame, the weight of the rider, which is supported mainly on the two wheels of the vehicle.

From the above description it is seen that the bridge-piece *k*, which unites the lower end of the members *a* and *b* of the frame and which receives the blade *j*, is made in one piece and then routed out to receive said blade.

In Figs. 7 to 11, inclusive, is shown a modification of this construction, in which said bridge-piece is made in two hollow parts, which are subsequently secured together and secured to the lower ends of the frame members *a* and *b*, as is the bridge-piece *k*. Said modified construction consists in making the bridge-piece *k* (or which is in this construction equivalent to said bridge-piece) in the manner shown in Fig. 10 particularly, and it consists in striking out of sheet metal or in forging said bridge-piece in two halves *r*, the line of division lying in the plane of the longitudinal center of the chamber which receives the blade *j*. These two parts *r* when placed together, as shown in Fig. 10, constitute practically the same construction as the bridge-piece *k*, save for the projections on the ends of the latter, to which the frame members are secured. In this modified construction the lower ends of the members *a* and *b* of the frame are slotted to receive the two members *r*, the opposite ends of the latter lying flush with the outer surface of the two members *a* and *b*. The sliding of the tubular frame members over this bridge-piece in the manner described would of course leave the ends of the tube lying on each side of said bridge-piece open at their lower ends, which would leave an unfinished appearance to the structure. To give the required finish to the end of the tubular frame members and also to strengthen the attachment between the bridge-piece *k* and the ends of the frame members a piece *s* (shown particularly in Figs. 10 and 11) is secured to each side of the members *r* in such manner that when the frame members *a* and *b* are fitted over the two parts *r* of the bridge-piece *k* said open ends of the frame parts will rest upon a shoulder *t* of said pieces *s*, a flange *u* thereof projecting up inside of the said members, as shown in Fig. 11. These parts all having been fitted together and pinned in the usual manner are brazed, and thus the two parts *r* are brazed together and to the frame members *a* and *b*, and the pieces *s* are at the same time brazed to the sides of the two parts *r* of the bridge-piece and to the said members *a* and *b*. Thus when the structure is completed it is in effect the same as the

bridge-piece shown in Fig. 1, except that by reason of the method of uniting the frame members *a* and *b* to the bridge-piece the latter may be made somewhat shorter, although there is no especial advantage in this, the main advantage consisting in the fact that the construction is lighter and somewhat cheaper.

Obviously though the blade *j* has been described herein as of a certain construction its particular shape as described is not an essential and might be widely varied. For example, instead of having a single blade, as shown in Fig. 9, said blade might consist of two or three narrow blades parallel one with the other, as shown in Fig. 12, and the bridge-piece *k* be modified in its construction to receive the blades of the construction as thus described.

Both the construction shown in Figs. 1 to 6 and that shown in Figs. 7 to 11 constitute practically a mortise-joint (which permits more or less play in the plane of the said joint) between the crank-hanger and the frame of the machine, and any modification of the construction described herein which would constitute practically such a joint would come within the scope of this invention, for by means of such a joint only is it possible to obtain in a construction of this character both cheaply and efficiently the objects of this invention—viz., great rigidity of the frame as a whole in one plane and a free though limited swinging movement of parts of the frame in a plane at right angles to the first.

Whether the bridge-piece *k* be made, as shown, in a single piece or in two pieces, it constitutes a perfect shield for the bearing-surfaces within it against the entrance of either mud or dust, and thus prevents the excessive wear which exposed bearings would be subjected to and at the same time prevents the entrance of water.

No claim is herein made to the combinations involving the removable rear-wheel brace and the removable rear-wheel fork with the crank-hanger secured rigidly thereto, as said subject-matter and the claims thereon form the basis of a previous application filed on or about the 28th day of January, 1901, Serial No. 44,961. Said matter is shown in the present case, however, in order that the invention in its entirety may be fully understood by those skilled in the art.

Having thus described the invention, what is claimed is—

1. In a bicycle the combination of a rigid front frame a telescoping rear brace; a rear-wheel fork pivotally connected to said brace; a crank-hanger rigidly secured to the fork; and a pivotal connection between said hanger and the front frame, substantially as described.

2. In a bicycle the combination of a rigid front frame a telescoping rear brace; a rear-wheel fork pivotally connected with said

brace; a crank-hanger rigidly secured to said fork; and a pivotal connection between the crank-hanger and the fork constituting substantially a mortise-joint, whereby said fork and hanger may move only in the plane of the frame, substantially as described.

3. In a bicycle-frame, the combination of a rear-wheel fork; a crank-hanger rigidly secured thereto; a blade secured to said hanger in a plane at right angles to the axis thereof; a chamber in the frame for receiving said blade, whereby said hanger and fork may move in the plane of the frame only; and a pivotal connection between said blade and the frame, substantially as described.

4. In a bicycle-frame, the combination of a rear-wheel fork; a crank-hanger rigidly secured thereto; a blade secured to said hanger in a plane at right angles to the axis thereof; a chamber in the frame for receiving the blade, whereby the hanger and fork may be moved in the plane of the frame only; and a pin extending transversely through said chamber and blade, substantially as described.

5. In a bicycle-frame, the combination with two members *a* and *b* converging toward the crank-hanger; a bridge-piece to which the lower ends of said frame members are rigidly secured; a crank-hanger; a rear-wheel fork rigidly secured to said hanger; a blade on the crank-hanger extending at right angles to the axis thereof; a chamber in the bridge-piece for receiving said blade, whereby the rear-wheel fork and hanger may swing in the plane of the frame only and are held against lateral movements; and a pivot-pin extending through the blade and supported in the bridge-piece, substantially as described.

6. In a bicycle-frame, the combination of a rear-wheel fork; a crank-hanger rigidly secured to said fork; a pivotal support for said hanger on the frame, whereby the fork and hanger may have a swinging movement in the plane of the frame only; and a spring in-

terposed between the frame and the crank-hanger to one side of its pivotal support, substantially as described.

7. In a bicycle the combination of the front frame having a chamber in its lower end; a rear-wheel fork; a crank-hanger rigidly secured thereto; a blade secured to said hanger in a plane at right angles to the axis thereof and extending into the chamber; a pivot-pin extending through said blade and chamber; concentric ball-races around said pin in the blade and sides of the chamber; balls mounted in said races; and means for laterally adjusting said balls, whereby said crank-hanger may swing in the plane of the frame only, substantially as described.

8. In a bicycle-frame, the combination with members *a* and *b*; a chambered member rigidly uniting the lower ends of said members *a*, *b*; a crank-hanger; a blade extending up from said hanger at right angles to the axis thereof and adapted to enter the chambered member; a screw-threaded opening formed in the side walls of said chambered member; an annular nut fitted in said threaded opening; ball-races concentric with said opening in both sides of the blade and in one wall of said chambered member and likewise upon the nut; balls mounted in said races; a bolt passing through one wall of said chambered member, said blade and said nut centrally of said ball-races and serving as a pivot-pin for said blade; and a nut on said bolt for locking said annular nut, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

ANGIE E. TRAVIS,
Administratrix of the estate of Charles L. Travis, deceased.

Witnesses:

HARLAN P. SMALL,
FRANK J. DEMOND.

Corrections in Letters Patent No. 739,237.

It is hereby certified that Letters Patent No. 739,237, granted September 15, 1903, upon the application of Angie E. Travis, administratrix of Charles L. Travis, deceased, of Springfield, Massachusetts, for an improvement in "Bicycles," was erroneously issued to said "Angie E. Travis" as owner of said invention; whereas the said Letters Patent should have been issued to the *Hygienic Wheel Company, of New York, N. Y., a corporation of West Virginia*, as owner of the entire interest in said invention, as shown by the assignments of record in this office; and that the following corrections should be made in the printed specification, to wit: Page 3, lines 125 and 132, commas should be inserted after "bicycle," and in lines 126 and 133 semicolons should be inserted after "frame"; and that the said Letters Patent should be read with these corrections therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 13th day of October, A. D., 1903.

[SEAL.]

F. I. ALLEN,
Commissioner of Patents.

brace; a crank-hanger rigidly secured to said fork; and a pivotal connection between the crank-hanger and the fork constituting substantially a mortise-joint, whereby said fork and hanger may move only in the plane of the frame, substantially as described.

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