(No Model.) 3 Sheets—Sheet 1.

H. S. OWEN.

VELOCIPEDE.

No. 481,053. Patented Aug. 16, 1892.

Fig. 1

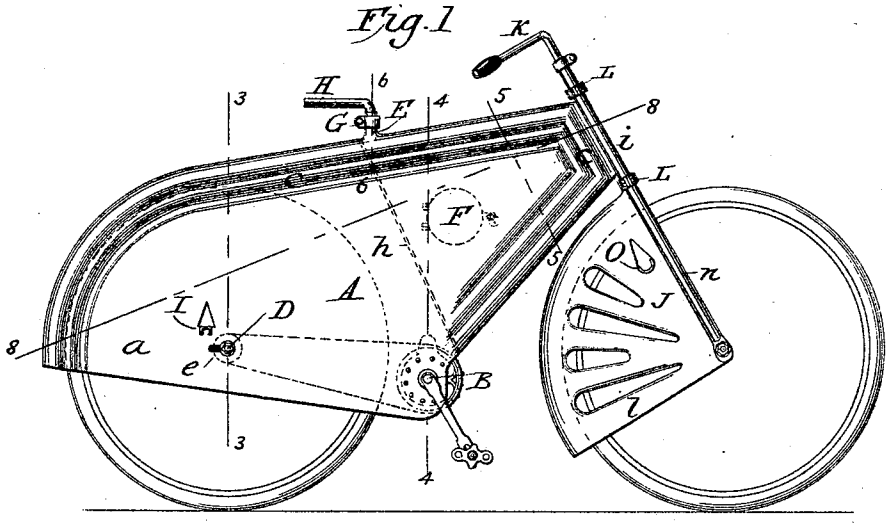


Fig. 2

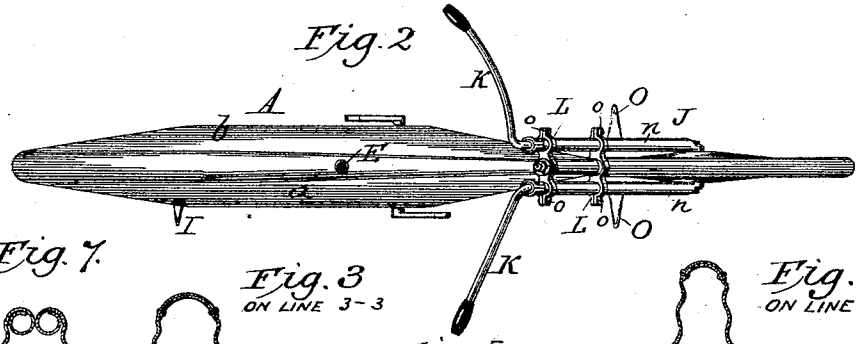


Fig. 7.

Fig. 3
ON LINE 3-3

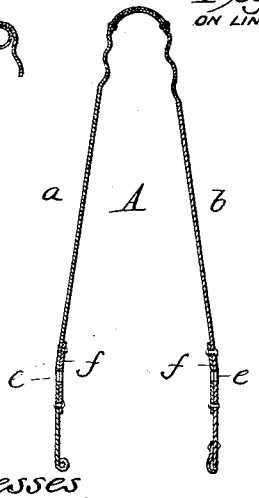


Fig. 5.
ON LINE 5-5

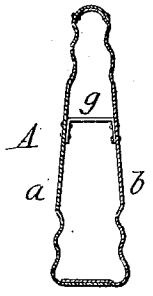


Fig. 6
ON LINE 6-6

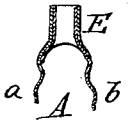
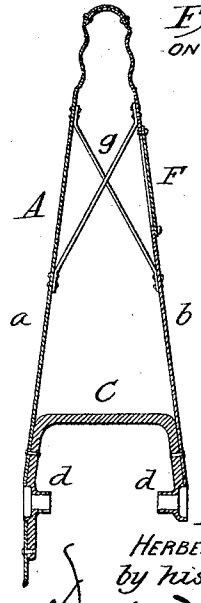


Fig. 4.
ON LINE 4-4



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(No Model.) 3 Sheets—Sheet 2.

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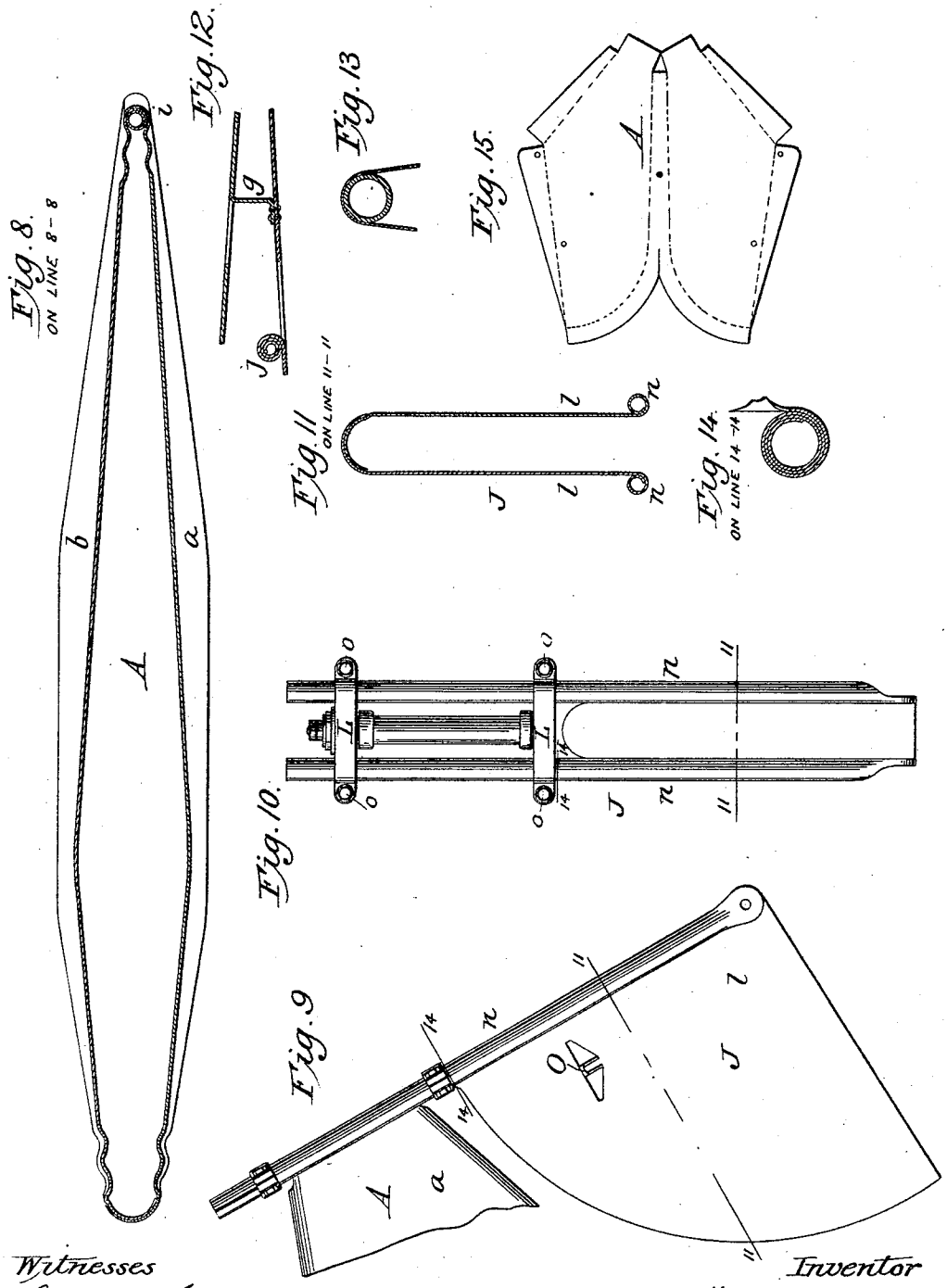
VELOCIPEDE.

No. 481,053. Patented Aug. 16, 1892.



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(No Model.) 3 Sheets—Sheet 3.

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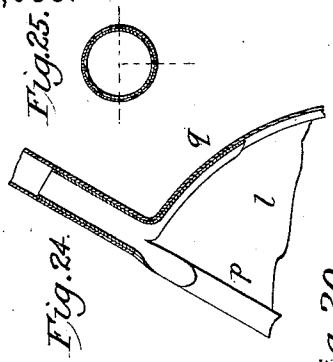
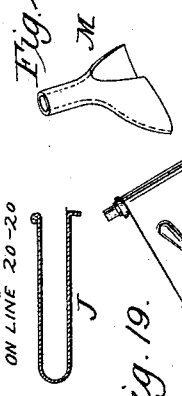
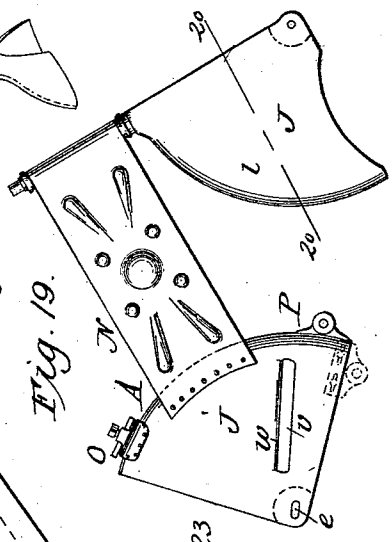
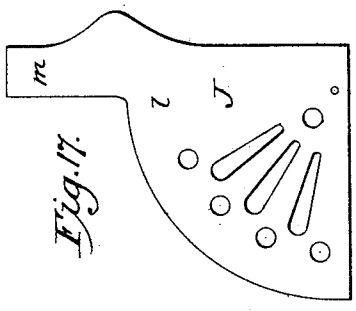
VELOCIPEDE.

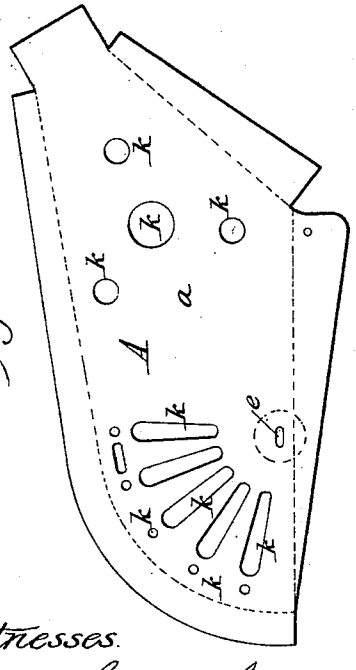
No. 481,053. Patented Aug. 16, 1892.

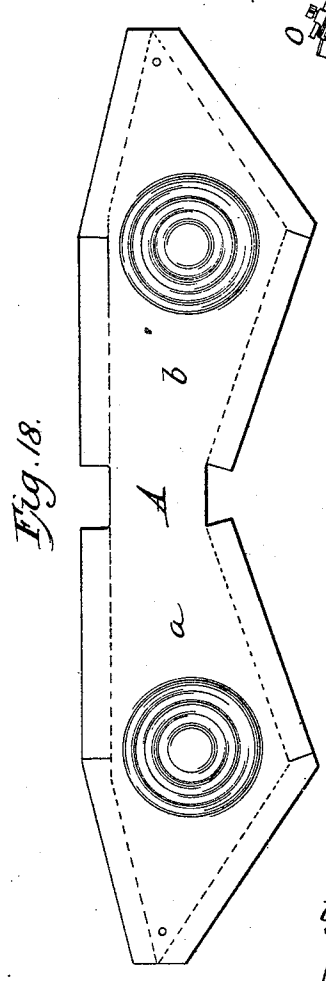


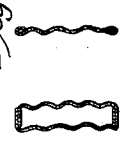


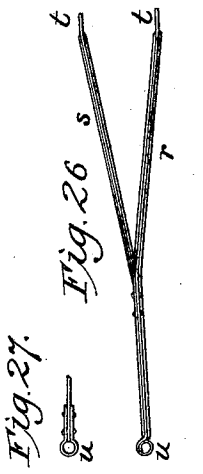












Witnesses.
Sidney P. Hollingsworth
Horace A. Dodge.

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UNITED STATES PATENT OFFICE.

HERBERT S. OWEN, OF WASHINGTON, DISTRICT OF COLUMBIA.

VELOCIPEDE.

SPECIFICATION forming part of Letters Patent No. 481,053, dated August 16, 1892.

Application filed February 3, 1892. Serial No. 420,185. (No model.)

To all whom it may concern:

Be it known that I, HERBERT S. OWEN, a citizen of the United States, residing at Washington, District of Columbia, have invented certain new and useful Improvements in Velocipedes, of which the following is a specification.

My invention relates to bicycles, tricycles, and like vehicles, and has reference particularly to the construction of the framing thereof—that is to say, of that portion of the vehicle by which the load is supported upon the wheels and the wheels are coupled or connected.

The objects of my invention are to greatly simplify and cheapen the construction of such framing, and also to secure the greatest possible strength and stiffness consistent with lightness of construction.

To this end the invention consists, essentially, in constructing the framework in whole or in part of suitable material in the form of thin sheets. The material employed may be varied; but among others admirably suited to the purpose may be mentioned the various sheet metals, tough paper or strawboard suitably treated, vulcanized fiber, and the like; but I desire it to be understood that throughout the following description the use is contemplated of any suitable thin material capable of being pressed, fashioned, drawn, folded, bent, or wrapped into the required form, and capable when thus put into shape of withstanding effectively the strains to which it is subject in the practical use of machines of this character.

In the accompanying drawings, Figure 1 is a side elevation of a bicycle of the well-known "Safety" variety, the wheels of which are simply represented in outline, since their construction constitutes no part of the invention herein set forth; Fig. 2, a top plan view of the same; Fig. 3, a transverse section through the framework on the line 3 3 of Fig. 1; Fig. 4, a similar section on the line 4 4 of Fig. 1; Fig. 5, a section on the line 5 5 of Fig. 1; Fig. 6, a section through the saddle-post tube or neck on the line 6 6 of Fig. 1; Fig. 7, a cross-section showing a modified form of union for the two side sections of the frame; Fig. 8, a section through the framing on the line 8 8 of Fig. 1; Fig. 9, a side elevation of the front fork and wheel-guard constructed of sheet material, showing the manner of rolling the same into tubular form to constitute the front forks of the machine; Fig. 10, a front or face elevation of the same; Fig. 11, a section on the line 11 11 of Fig. 9; Fig. 12, a horizontal section through the forward end of a reach or main frame, showing two different methods of bracing the same; Fig. 13, a view illustrating one method of forming a tubular head or of combining such head with the reach of sheet material; Fig. 14, a sectional view on the line 14 14 of Figs. 9 and 10, illustrating the manner of strengthening the edges of the sheet material and forming tubes or bars at such points as require special strength; Fig. 15, a plan view of a blank for the formation of the rear frame from a single piece of material; Fig. 16, a face view of a blank designed to form one side of the rear or main frame; Fig. 17, a face view of a blank designed to form one side of the front frame or fork and guard of a bicycle; Fig. 18, a face view of another form of blank designed to produce a rear or main frame in one piece of material and showing circular corrugations for stiffening the same; Fig. 19, a side elevation of a frame made up of separate sections suitably connected; Fig. 20, a sectional view on the line 20 20 of Fig. 19; Fig. 21, a perspective view of a reinforce for the neck or head of the front frame-section; Figs. 22 and 23, transverse sections showing different forms of reach or connection for employment in the construction represented by Fig. 19; Fig. 24 a longitudinal section, and Fig. 25 a transverse section illustrating a possible construction of the front fork or frame to be used in connection with stiffening-plates of sheet material; Fig. 26, a top plan view illustrating a simple and cheap construction of main frame of corrugated sheet metal, and Fig. 27 a view illustrating a different mode of forming the tubular head or neck of such frame.

In the construction of the frame-work of velocipedes, bicycles, tricycles, and vehicles of this general class it has hitherto been customary to employ either solid bars of wood or of metal, or tubular bars, and to unite the various pieces required by bolting, riveting, soldering, brazing, or welding. Such constructions are not only costly in themselves, but involve a

large amount of hand fitting and special adjustment after the parts are made, which greatly enhance the ultimate cost of the machines. Moreover, unless the parts are made quite heavy or an elaborate system of bracing be resorted to the frames are not as rigid as they should be, and as a consequence a considerable amount of power applied to the pedals is wasted through the yielding or springing of the frame, and a fall or blow is apt not only to throw the machine out of proper adjustment, but to more or less seriously injure the framing and detract from its strength. My invention is designed to overcome these various difficulties and to produce a frame that shall be perfectly rigid under all the strains to which it can possibly be subjected in use and to insure the unvarying adjustment of parts to their proper relative position after the tools and dies for the production of a single frame of given dimensions are once made.

To this end I adopt the construction represented in the accompanying drawings, which show the embodiment of my invention in a variety of different forms, to which might be added a great many more without departing from the spirit or scope of my invention. The forms shown are deemed sufficient to place the public in full possession of all information necessary to the practical utilization of the invention.

Referring to said drawings, A, Figs. 1 to 8, inclusive, represents the main frame or what corresponds to the backbone, rear fork, and rear wheel-guard of a bicycle. As best indicated by Figs. 3 to 8, this frame is composed of two sheets *a* and *b* of thin material, bent, compressed, or shaped in any convenient way to the form required, their edges being lapped and united by riveting, brazing, soldering, seaming, cementing, or in any of the well-known ways of uniting this sheet material, the brazing and soldering applying, of course, only to metals, while the riveting, folding, seaming, and cementing will apply not only to metals, but to all other materials suitable to the purposes of this invention.

In Figs. 1 and 2 the frame A is represented as provided with a series of corrugations *c*, following the general contour of the frame from the rear end of the wheel-guard along the upper side of the frame downward along the line of the head or neck of the frame, and thence rearward to a point near the pedal-shaft B, the machine represented in these figures being a rear-drive chain and sprocket-wheel machine. It is proper, however, to say in this connection that the invention is equally applicable to machines of other types and regardless of the manner of driving the same, the construction represented being merely one of many types that might be chosen.

As shown in Figs. 1 and 4, the side plates or sheets *a b* are carried downward at or about their midlength sufficiently to permit the introduction between them of a bracing-yoke C, which may be either of the form shown in Fig. 4 or of any other desired form and which may be riveted in place, as indicated, or secured by soldering or brazing in the event of its being made of metal or in any of the well-known ways in which the chosen materials are united in other relations.

The yoke C is represented as formed with tubular necks *d*, of suitable form and dimensions to receive the bearing-collars of the ordinary pedal-shaft and the intervening anti-friction balls or rollers. The form and dimensions of the necks *d* may be varied as desired or to suit the particular form of pedal-shaft employed.

As shown in Figs. 1 and 3, the side plates or sheets *a b* are provided with elongated openings or slots *e* to receive the ends of the axle D of the rear wheel, the elongation of the openings permitting forward and backward adjustment of said axle to give the necessary tension to the driving chain or band when such is used. The openings *e* are reinforced by plates *f*, riveted or otherwise secured to the plates *a b*, as shown in Fig. 3.

Fig. 5 shows the sectional form of the frame A on the line 5 5 of Fig. 1, and also illustrates the manner of lapping the plates *a b*, both at the upper and at the lower side, whereby a great degree of stiffness or rigidity is secured, the parts being caused to brace each other most effectively. To further secure such stiffening effect, cross-pieces *g* may be extended from the plate *a* to the plate *b* at such points as are found convenient or desirable in the manner illustrated in Figs. 4 and 5.

If preferred, the braces *g* may be formed by punching a strip or ear from one plate *a b* and bending it across to the opposite plate and connecting it therewith, as indicated in Fig. 12. So, too, in lieu of the upright braces *h* a portion may be cut from one of the side plates and rolled into tubular form, making a brace *j*, as shown in Fig. 12.

Where the edges of the sheets *a* and *b* are prevented by the intervention of the wheel or from other cause from being brought together, it will be found desirable to strengthen them by rolling them into tubular form or lapping or folding them, as shown in Figs. 3 and 7.

The connection of the plates *a* and *b* may be effected in the manner illustrated in Figs. 3, 4, and 5—that is to say, by lapping their edges one upon the other and riveting the parts, or they may be cemented in the case of materials capable of union by cement, or in the case of metals they may be brazed or soldered with or without riveting.

In Fig. 7 I have represented the meeting edges at the upper side of the frame as each rolled into tubular form, the two tubes being laid close together and brazed, or otherwise joined, if need be.

In the application of braces or stiffening-pieces to the frame A, I propose to employ,

among others, a transverse bracing-plate *h* (indicated by dotted lines in Fig. 1) and to extend the same from a point at or near the location of the saddle post-neck or tube E downward to a point advisably in advance of the pedal-shaft B, thereby forming a luggage-chamber in the forward part of the frame, to which access may be had by a suitable door F, Fig. 1, or other closure, or this may be omitted. The partition may be made fast to the side walls of the chamber, and the door may be furnished with any suitable locking device, a padlock being indicated in the drawings.

The location of the brace *h* serves to distribute the strain due to the weight of the rider entirely across the frame A from its upper to its lower side, and to prevent the bulging or collapsing of the sides *a* and *b*. The neck E may be formed by bending up projecting ears formed upon the blanks from which the sides *a b* are constructed, or by drawing up the material when of a nature permitting such drawing, and in either event may be provided with a reinforce, as shown in Fig. 6.

A clamp G serves to hold the saddle-post H in the neck E at the required adjustment.

I indicates a step which may be formed by punching a prong or ear of the sheet material from the body *a* or *b* and turning it outward and bending it in such shape as to stiffen or brace it, Fig. 1 showing a V-shaped prong which is bent into inverted-U shape, so that the inverted inner ends rest against the side face of the plate *a*.

In Figs. 1 to 8 I have represented the plates or sheets *a b* as wrapped into tubular form at the forward end, one wholly or partially enveloping the other and thereby constituting a tubular head *i*, through which connection is made with the front fork or forward section of the frame. This head may be further strengthened by placing within it a tubular or solid spindle, if desired, or, in fact, any suitable sort of head may be secured to the forward ends of the plates *a b*.

The main frame illustrated in Figs. 1 to 8, inclusive, as also that shown in Figs. 15 and 16, are designed to extend backward and downward over the rear wheel and to constitute a mud-guard therefor; but it is obvious that the distance to which the frame shall be extended is a matter of option or judgment and may be varied at will. So, too, the matter of corrugation is one wholly within the discretion of the constructor, the purpose of the corrugations being primarily to stiffen and strengthen the material against facewise strains or movements.

In Figs. 1 to 8 the corrugations take the general trend of the outline of the frame, while in Fig. 18 circular corrugations are represented. These may be carried over a greater or less extent of the surface, as found desirable. In whatever form they may be their effect is to greatly stiffen the material and to enable very thin sheets to withstand an enormous strain in all directions, a hollow or tubular shell or frame constructed of such material possessing a degree of stiffness and strength almost beyond belief.

If desired, the plates *a b* and, in fact, all parts of the frame may be provided with perforations or openings *k*, serving the double purpose of lightening the frame and of enhancing its beauty.

As stated and as indicated by said figures, the frame A (represented in Figs. 1 to 8) is designed to be made up in two pieces; but, if preferred, the sheets *a b* may be made integral or both cut from a single sheet, as indicated in Fig. 15, the blank thus produced being folded along the middle corresponding to the upper line of Fig. 1. So, too, a single blank may be cut in the form represented in Fig. 18, the folding-line in that case being transverse to the length of the blank, so that the fold will come at that point forming the head or neck of the frame A.

The front fork or forward section of the frame is indicated by the letter J in Figs. 1, 2, 9, 10, 11, 17, 19, 20, and 24, and in its preferred form consists of a combined fork and mud-guard made either of one or of two pieces of sheet material. The simplest and easiest way of producing said front fork with present appliances is by cutting or forming two blanks *l* of substantially the form represented in Fig. 17 and rolling the forward edges into tubular form, as indicated in Figs. 1, 2, 9, 10, 11, 14, and 20. It is important that the upper portion of the tube so formed, and particularly that portion where the curved line of the guard joins the upright line of the neck, be made somewhat stronger than the lower part, because of the greater strain to which the fork is subjected at the union of the neck with the side plates or forks. For this reason the blank is advisably made with a widened portion *m* at the upper end, which permits the tube formed by rolling the forward edge of the blank to be of a great number of thicknesses in said part than elsewhere.

Fig. 17 indicates the blank in its unfolded shape, while Figs. 1, 2, 9, 10, and 11 show the forward edges rolled up into tubular form and the side plates or blanks *l* overlapped and united in the same manner as the plates *a b* of the main frame A on the curved line conforming to the curvature of the wheel and serving the purpose of a mud-guard for the forward wheel and a stiffener for the forks. This construction is not only light, but is very strong, is neat in appearance, and produces two upright tubes *n*, which serve to receive handle-bars K, which, being made of suitable length, may be vertically adjusted in the tubes, and, being independent, may be drawn apart and brought together to give any desired spread or angle. This is a feature of considerable value, as it enables the purchaser of a machine to perfectly adapt the handles to the requirements of his use or to adjust it

to suit his taste and convenience. The tubes *n* are connected, spaced, and held against movement one in relation to the other by means of cross-heads L, which may be secured upon the tubes in any convenient or desirable manner, but which are preferably split or slotted and drawn together upon the tubes by clamping-plates *o*. Owing to the compressibility of the rolled or wrapped tube, assuming that its contacting-faces be not united in any manner, it is possible to so reduce the tube through pressure of the clamping-bolts *o* as to cause the rods or stems of the handle-bar to be firmly gripped and held in the tubes at any desired adjustment. Obviously, however, special clamps independent of the screws *o* may be employed, if desired.

The construction of the flexible or hinge connection between the main frame A and the front frame or fork J may be varied at will, any usual construction being applicable to the frame herein represented, and for this reason I deem it unnecessary to either illustrate or describe the details of such construction.

In Fig. 19 I have represented the front frame or fork J and the corresponding rear frame or fork proper J′ as made each of a single piece of sheet material folded along the line which subsequently forms the mud-guard portion and drawn or swaged by means of powerful dies or molds in the case of vulcanized fiber and like material to the required curve. This produces an exceedingly stiff fork or shell, which, being reinforced at the point or points where the axles are to be applied, will withstand all strains that can be brought upon it in use, particularly if the side faces are corrugated, as they ordinarily will be in practice. With such construction I contemplate the employment of a reinforce M, Fig. 21, fitting within the forward shell or fork J and extending upward through an opening in the same to constitute or to give strength to the neck of the hinge or swivel connection between the front and rear frames. In said Fig. 19 a reach or backbone N is represented as riveted to the rear fork or shell J′, extending thence forward and folded around a tubular head, through which the neck of the forward fork or shell passes. This reach or backbone N may be either of a double thickness, as indicated in Fig. 22, or a single thickness, as indicated in Fig. 23, and may in either case be heavily corrugated to give the required stiffness. If made of a single thickness, the edges should be rolled into tubular form or folded to give proper stiffness and strength. Instead of making the forward frame, shell, or fork of one or two plates or sheets, as above described, I may first produce the combined fork, neck, and guard represented in Fig. 24 by splitting a common tube or by inserting a short section of tube within a long tube and splitting the compound tube into three sections, two to form the side bars *p* of the front fork and the third to form the mud-guard *q*, said parts being connected, braced, and stiffened by plates or sheets of thin material, if desired, as will ordinarily be the case. Foot-rests or coasting-rests O may be punched from the side plates or sheets *l* and bent to proper form to resist the strain to which they will be subjected in use, such construction being represented in Figs. 1, 2, and 9. In said Fig. 19 I have represented, also, a block P, secured to the forward side of the rear shell or fork J′ to carry the pedal-shaft, and have shown in connection therewith the elongated openings or slots *e* to receive the rear-wheel axle; but I may obviously substitute for this arrangement that illustrated by dotted lines in the same figure—that is to say, the block P may be placed between the side walls of the shell J′ and may be adjustable toward and from the rear axle by means of slots and clamping-bolts, as indicated. Under these constructions it will be advisable ordinarily to carry the sprocket on the outside of the shell instead of inside, as under the construction represented in Figs. 1 and 2 and to afford passage for the driving-chain when such chain is employed it will be necessary to provide an opening *v* in the side of the shell J′, as shown in Fig. 19, the portion cut out to form the opening being left integral with the side of the shell along its upper side and turned laterally to form a guard *w* over the chain. A clip Q, riveted or otherwise made fast to the rear shell J′, serves to carry the saddle-spring and permit adjustment thereof, as required.

In Figs. 26 and 27 I have illustrated a construction designed more particularly for small and cheap machines, Fig. 26 representing a top plan or edge view of the main frame A, composed of two parts *r* and *s*, the latter riveted or bolted to the frame and each composed of corrugated sheet material with flattened ears or ends *t*, designed to be perforated to receive the rear axles, and having at the forward end a tubular head *u*, formed either integral with the part *r* by coiling the same or of a separate piece of sheet material bent to the shape shown in Fig. 27, and riveted, bolted, or otherwise made fast to the forward end of the part *r*.

As stated at the outset, my invention consists not simply in the details of construction above set forth, as these are susceptible of wide variation, not only as to the general form and the type or style of machine for which they may be designed, but as to the nature of the material or materials used, as to the manner of bracing the parts, and as to other matters of comparatively minor importance.

So far as I am aware no one has ever before proposed to construct the framework or the front or rear fork or backbone or reach of a machine of this character of sheet material so disposed as to carry the weight and strain without the employment of solid bars or tubes

of metal or wood, and, therefore, believing myself to be the first to propose the construction of a frame or any substantial part of the frame of a machine of this class wholly or essentially of sheet material, I mean to claim the same without restriction to details.

It is believed that under the construction above set forth and with proper selection of materials it will be feasible to make a frame which shall not be heavier than the average frame as at present constructed (if as heavy) and which shall possess a degree of stiffness and strength vastly beyond that of any frame now in use. Moreover, the protection of the wheel, the prevention of the throwing of mud therefrom, the luggage-space secured, and other points that will readily occur to the user of such machines render this construction of marked value, while the exceeding cheapness and the absolute certainty of the adjustment of the parts when the necessary tools and implements for the construction of the first frame are once made permit the manufacture of the frames at a figure vastly below anything heretofore possible. The most prominent advantage due to this construction is, however, the vastly reduced number of parts or pieces required and the consequent lessening of labor and cost in fitting, adjusting, and finishing the same. In this particular the proposed plan is one of great value, the number of parts requiring handling, fitting, and adjustment being reduced to a minimum.

As already indicated, the invention is designed to be applied to the construction of the frames of all classes of velocipedes, by which it is meant to include bicycles, tricycles, single and tandem machines, and the various other types known to the trade and the public.

It will be seen that each side wall or shell may be made of two or more thicknesses and that the sheet material may be of varying thickness in different parts.

No broad claim is herein made to a rolled or wrapped tube of varying thickness in its different portions, nor to a blank for the production thereof, as I contemplate a separate application therefor.

The claims of the present case, so far as this feature is concerned, are limited to a bicycle fork or shell of the character shown and described.

The terms "sheet," "sheet material," and "sheet metal," are here used to indicate that class of materials commonly designated by the term "sheet" in contradistinction to the term "plate." Thus as applied to metals it signifies metals thinner than what is commonly known as "plate metal."

While it is impracticable to state a precise thickness as marking the dividing-line between sheet and plate material, a clear distinction for the purposes of this case may be made by saying that the term "sheet" is meant to exclude material of a thickness sufficient to withstand by reason of its thickness merely, the strains to which a vehicle-frame is subjected. The term is meant to include only materials so thin that they are unable, by reason of their thickness alone, to give the requisite strength and rigidity, but which when so disposed as to receive the strains edgewise or in a direction from one edge of the material to another will withstand the same.

Channel-bars—plate iron such as is used for boilers—and like heavy bars and plates are not comprehended within the terms mentioned, nor within my invention.

Having thus described my invention, what I claim is—

1. A frame for bicycles and other vehicles, constructed wholly of sheet material bent to form and disposed, substantially as shown and described, to receive the strains from edge to edge or in the directions of the length and width of the material throughout all portions of said frame.

2. A frame for bicycles, tricycles, and other vehicles, consisting of sheet material fashioned to the required form and folded along the lines of special strain, substantially as set forth.

3. The herein-described main frame for a bicycle, consisting of sides *a b*, of sheet material, fashioned to the required form and joined along the upper side to form a backbone or reach, substantially as set forth.

4. The herein-described main frame A, consisting of side sheets or plates *a b*, extending from the head of the machine to a point over the back wheel and joined along its upper side, substantially as shown, whereby it is adapted to form a connection between the front fork or frame and the rear wheel and to cover and inclose the latter.

5. The frame A, consisting of sides *a b*, of sheet material, joined at their forward ends and provided at such point with a neck or head for connection with the forward fork or frame.

6. A main frame for bicycles and like vehicles, composed of sides *a b*, of sheet material, formed from one piece, connected by intermediate braces, substantially as shown and described, whereby the sheets are maintained in proper position to receive the strains edgewise or in the directions of their length and width.

7. A main frame for bicycles and the like, consisting of side plates *a b*, of thin material, rolled at their forward ends to form a tubular head.

8. A main frame for bicycles and the like, consisting of side plates *a b*, united at their edges through a portion of their length, and an intermediate partition or brace *h*, extending from a point near the saddle-post neck downward toward the lower side of the frame to distribute the strain throughout the latter.

9. In combination with a frame composed of side sheets or plates *a b*, united throughout

a portion of their length, a transverse partition *h*, closing the space between the sheets, and an opening in one of the sheets *a b*.

10. A frame for bicycles and other vehicles, composed of sheet material fashioned to the required form and provided with reinforces at the points where the shafts are required to pass through the same.

11. In combination with frame A, brace or yoke C to receive the crank-shaft bearings.

12. In combination with a frame consisting of sheet material fashioned to form and provided with slots or openings *e*, an axle D, having its ends seated in said slots, substantially as and for the purpose set forth.

13. In combination with frame A, provided with slots or openings *e*, reinforces or strengthening-plates *f*, surrounding said openings, substantially as and for the purpose set forth.

14. In a frame for bicycles and the like, formed of sheet material, a step consisting of a prong or ear of the sheet material cut from the body and bent outward, substantially as set forth.

15. In combination with frame A, having tubular neck or saddle-post support E, a reinforce-tube applied to said neck, substantially as shown.

16. A frame for bicycles and the like, composed of sheets *a b* of thin material and a brace cut from and integral with one of said sheets, extending to the other of said sheets and secured thereto.

17. In a frame composed of sheet material, a brace or stiffening-rib formed of an integral portion of the sheet, rolled, bent, or folded laterally.

18. A main frame for bicycles and the like, formed of a single piece of sheet material cut to proper form and bent to the required shape, the meeting edges being joined together, substantially as and for the purpose set forth.

19. A front fork or shell for bicycles, tricycles, and the like, consisting of sheet material cut to the required form and rolled upon itself to produce a tubular brace or post.

20. A bicycle fork or shell composed of sheet material, having its forward edge rolled upon itself to form a tubular post or brace, one portion of the tube having a larger number of convolutions than another, substantially as and for the purpose set forth.

21. The blank for the production of a side plate of a bicycle fork or shell, provided with the widened portion *m*, adapted to be rolled upon itself previous to the rolling of the entire forward edge of the blank, whereby the tubular front edge is formed of greater thickness in its upper than in its lower part.

22. A bicycle fork or shell composed of sheet material folded or bent through its middle on a curved line, whereby it is adapted to constitute a combined fork and guard, each serving to brace and stiffen the other.

23. In combination with shell or fork J, reinforce or neck M, applied thereto.

24. A bicycle fork or shell J, provided with "coasters" or foot-rests O, cut from the body of the shell and turned outward, substantially as described.

25. In combination with a frame for bicycles and like vehicles formed of sheet material, an adjustable sleeve or block applied thereto and adapted to support a shaft or axle.

26. A bicycle-frame constructed of sheet material and having an opening through its side for the passage of the driving-chain, the material removed from the opening being bent laterally to form a guard for the driving-chain.

27. The herein-described fork or shell J, consisting of side plates *l*, joined at their rear edges and provided at their forward edges with integral tubular posts *n*.

28. In combination with shell J, having tubular posts *n*, slotted cross-heads L, applied to said tubes, and clamping-bolts *o*, applied to the slotted ends of the cross-heads, whereby said cross-heads are secured in place upon the tubes.

29. In combination with coiled tubes *n* and with handle-rods K inserted in said tubes, clamping devices applied to the exterior of the tubes and adapted to compress them upon the rods, substantially as and for the purpose set forth.

30. In combination with a front fork or shell of sheet material, a tubular neck or reinforce applied thereto, substantially as and for the purpose set forth.

31. A frame for bicycles, tricycles, and like vehicles, composed of sheet material and having within its walls a luggage-chamber, substantially as set forth.

In witness whereof I hereunto set my hand in the presence of two witnesses.

HERBERT S. OWEN.

Witnesses:

WILLIAM W. DODGE,

S. A. TERRY.