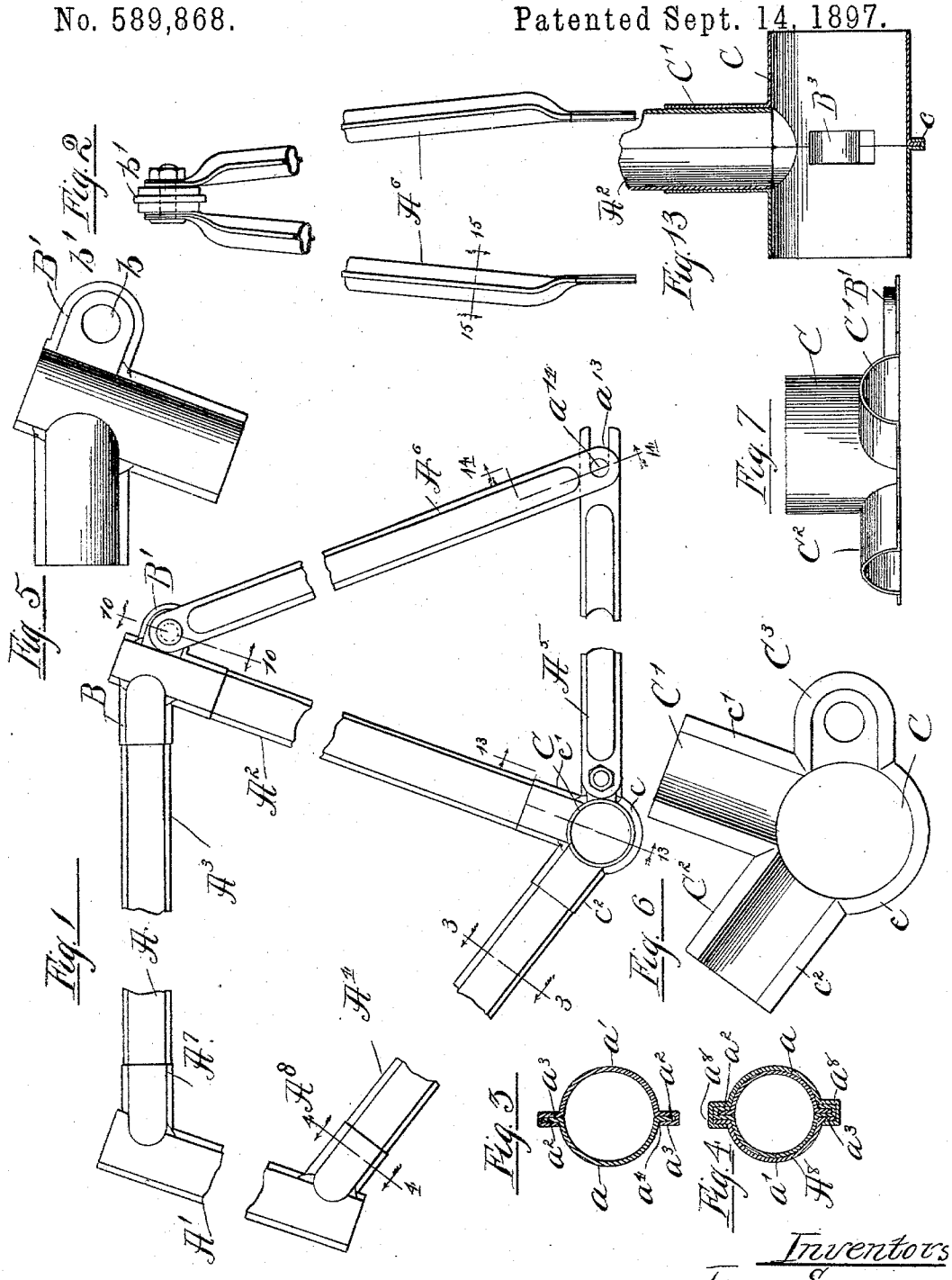
(No Model.) 2 Sheets—Sheet 1.

J. SPRUCE & C. H. KELLERMANN.

BICYCLE FRAME.

No. 589,868. Patented Sept. 14, 1897.



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(No Model.) 2 Sheets—Sheet 2.

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Fig. 8

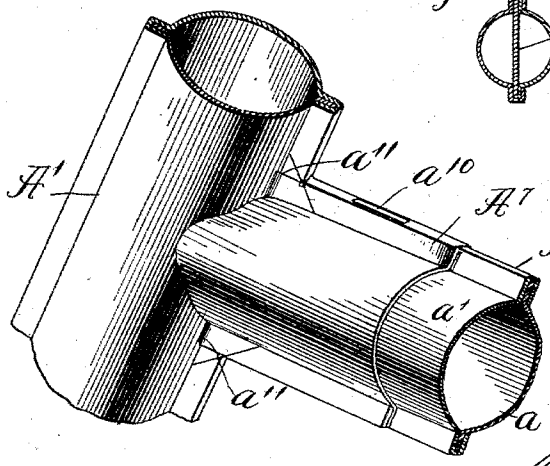


Fig. 15

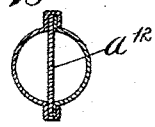


Fig. 14.

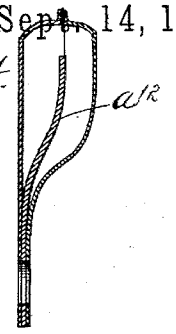


Fig. 9

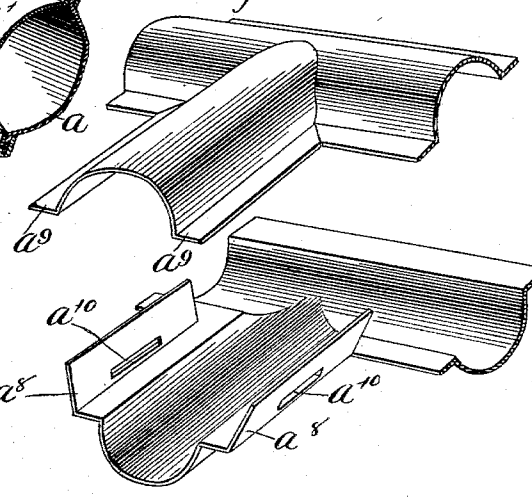


Fig. 10

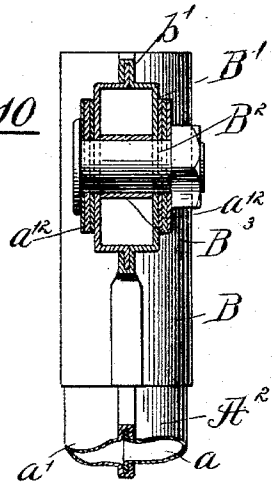


Fig. 11

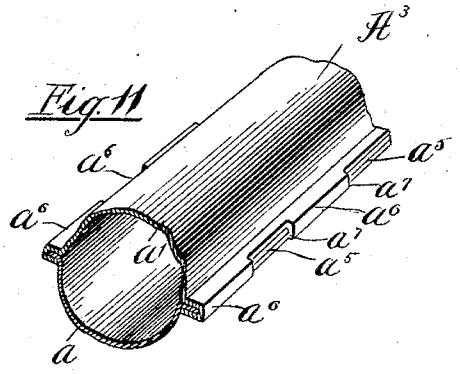
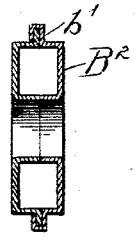


Fig. 12



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UNITED STATES PATENT OFFICE.

JAMES SPRUCE AND CHARLES HENRY KELLERMANN, OF KENOSHA, WISCONSIN.

BICYCLE-FRAME.

SPECIFICATION forming part of Letters Patent No. 589,868, dated September 14, 1897.

Application filed May 25, 1896. Serial No. 593,038. (No model.)

To all whom it may concern:

Be it known that we, JAMES SPRUCE and CHARLES HENRY KELLERMANN, of Kenosha, in the county of Kenosha and State of Wisconsin, have invented certain new and useful Improvements in Bicycle-Frames; and we do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

This invention relates to improvements in the construction of velocipede-frames; and the object of the invention is to provide a frame of hollow or tubular construction which while possessing practically all of the desirable characteristics of seamless drawn tubing in point of strength, lightness, neatness of appearance, &c., may yet be manufactured at a cost greatly less than that of frames of such seamless tubing.

To this end the invention consists in the matters hereinafter described, and more particularly pointed out in the appended claims.

The invention may be more readily understood by reference to the accompanying drawings, in which—

Figure 1 is a view in side elevation of a frame embodying our invention, the central portion of the bar members being broken away to reduce the size of the figure. Fig. 2 is a rear end elevation of the same. Figs. 3 and 4 are transverse sectional views, enlarged, taken on lines 3 3 and 4 4, respectively, of Fig. 1. Fig. 5 is a side elevation of the seat-post junction-piece enlarged. Fig. 6 is a side elevation of one of the side members of the crank-hanger. Fig. 7 is a top plan view of the same. Fig. 8 is a perspective view of the upper portion of the steering-head standard. Fig. 9 is a perspective of the two members which form the part shown in Fig. 8, showing the form of the same before being assembled. Fig. 10 is a sectional view taken on line 10 10 of Fig. 1, looking in the direction of the arrow. Fig. 11 is a perspective view of an end portion of one of the frame-bars. Fig. 12 is a transverse sectional detail of a modified form of the rear lug of the seat-post junction-piece. Fig. 13 is a detail section on line 13 13 of Fig. 1. Fig. 14 is a detail section of the lower end of one of the rear-fork members. Fig. 15 is a cross-section of the latter.

Referring to said drawings, A designates as a whole a bicycle-frame, which is shown in the present instance as having the general form of the ordinary diamond frame, and which consists of a front steering-head standard A′, seat-standard A^2, top horizontal frame member A^3, lower front member A^4, lower rear-fork members A^5 A^5, and upper rear-fork members A^6 A^6, a junction-piece B, at the upper end of the seat-standard, and a crank-hanger C.

The construction of the frame throughout, including both bar members and junction-pieces, is of the same general character, each individual part being constructed of two sheet-metal parts or sections, which are each made of trough or channel shape and provided with marginal outwardly-turned flanges which are interlocked or seamed together by bending to form a complete tubular structure. It will be obvious, however, that certain parts only—as, for instance, the frame-bars—may be made in accordance with the present invention and the remaining parts of the frame, such as the junction-pieces and crank-hanger, constructed in any usual or different manner. In other words, while we deem it desirable that all parts of the frame be made in accordance with the present invention, yet, if desired, the invention may be employed for certain parts only of the frame.

First describing the construction of the frame-bars proper, each bar comprises two parts or members, as $a\,a'$, Fig. 3, each of which is made from a strip of flat sheet metal of uniform thickness and of uniform width throughout its length, suitably rolled, swaged, or otherwise formed into semicylindric cross-sectional form, as indicated in the drawings. The member a is so bent or shaped as to leave a narrow flat marginal part or flange a^2 a^2 on each side margin or, in other words, is provided at each edge with a radially outwardly directed flange of uniform width extending throughout its full length. The member a' is a counterpart of the member a, except that the lateral flanges a^3 a^3 of said member are made of a width slightly more than twice the

width of the flanges a^2 a^2, and in the finished tube each flange is folded along its longitudinal center and bent over and against the flanges a^2, so as to closely embrace said flange on both sides of the latter and abut at its marginal edge, as at a^4, against the cylindric outer surface of the opposite member a', as indicated clearly in said Fig. 3. The bending or folding of the flanges a^3 a^3 over the flanges a^2 a^2 will be performed, preferably, by the use of suitable swaging-dies. The finished tube is accurately formed and cylindric except that it is provided at radially-opposite points with longitudinally-extending ribs formed by the folded or seamed flanges.

In the present instance the steering-head standard A′ is made of two parts swaged to shape and provided with integral tubular short extensions or sockets A^7 A^8 for the reception of the ends of the frame members A^3 A^4, respectively. The manner in which said parts are united to form rigid and reliable joints will now be described in detail.

Referring to Fig. 8, which is a detail view of the upper part of the steering-head standard, with a broken-off end portion of the upper frame member inserted therein, the main part or tubular body A′ thereof is constructed of two flanged parts united as hereinbefore described. The tubular extension A^7, the respective sides of which are integral with the corresponding parts of the main body A′, is made of such interior diameter as to permit the end of the bar member A^3 to be inserted therein. The parts A^3 A^7 will not, however, be assembled separately and the member A^3 thereafter telescoped within the socket A^7, for the tubular part A^7 will be formed over the end of the member A^3 and said parts caused to interlock in the following manner: The end member A^3, after being formed complete, as hereinafter described, has the edge of each of its flanges cut away or reduced in width, as at a^5 a^5, Fig. 11, to an amount substantially equal to the thickness of the sheet metal of which the socket member A^7 is formed, so as to leave one or more intervening projections a^6, having square or right-angled ends a^7 a^7. The overlapping flanges a^8 a^8 of the socket A^7 are of proper width to fold entirely over the ribs of the bar member and the flange a^9 of the opposite side member of the socket. The flanges a^8 a^8 are each provided with elongated slots or apertures a^{10}, corresponding in length with and adapted to receive the projections a^6 of the frame member when the parts are assembled. In practice in forming these parts the flanges a^8 a^8 will be only partly bent until after the end of the member A^3 has been inserted in position and the other member of the socket A^7 placed over the bar member, when the flanges a^8 a^8 will be bent down to complete the joint, as shown in Fig. 8. Obviously when the flanges a^8 have been bent over and brought finally into place the projecting parts a^6 will occupy the aperture a^{10} of the flanges a^8, and their outer ends or flanges will lie substantially flush with the outer marginal surface of said flange, thus producing a smooth and finished appearance in the joint. The union of the lower bar member A^4 with the part A^8 will be made in the same manner.

It will be obvious from the foregoing that a sectional view taken through one of the parts A^7 A^8 with the bar member inserted therein will show six thicknessess of metal at each rib or flange, while the ribs of the main body of the steering-head standard will be composed of but three thicknesses. It therefore follows that a shoulder must necessarily be formed at the juncture of the ribs of the socket portions with the ribs of the main body or part. In practice we prefer to make the offset or shoulder partly on each side, as indicated at a^{11}, Fig. 8. It will be further obvious that inasmuch as the flanges a^8 of the part A^7 and similar flanges of the main part A′ are turned substantially at right angles to each other at the intersection of the socket portion with the main part there will not be sufficient metal to completely cover the corner at said angle, and the end edges of the flanges will therefore appear as cut off obliquely, as also shown clearly in Fig. 8.

The junction-piece B, which serves to unite the rear end of the top member A^3, the seat-post standard A^2, and the upper ends of the rear-fork members A^6 A^6 is in its general construction, and so far as the construction of the sockets for the reception of the parts A^3 and A^2 is concerned, made like the parts A′ A^7, and its construction need not therefore be stated in detail. The part of the said junction-piece to which the upper ends of the rear-fork members A^6 A^6 are attached is, however, in the present instance made in the form of a lug or ear B′, (see Fig. 5,) provided with a bolt-aperture b, and against the opposite sides of which the ends of said fork members are held or clamped by a bolt passing through said aperture. As shown clearly in Figs. 5 and 10, the lug B′ is rectangular in cross-sectional form and the rib b', formed by the uniting flanges thereof, extends around the lug circumferentially in the median plane of the latter.

In order to afford a rigid support against which the clamping-bolts B^2 B^2 may act in securing the fork members, a spacing-sleeve section B^3 is inserted between the side walls of said lug, said sleeves being preferably made of the same interior diameter as and arranged concentrically with the bolt-aperture b, as shown.

The upper rear-fork members A^6 A^6 are of the same general construction as the main frame-bars throughout the principal part of their length, but in order to provide a suitable connection of their ends with the lug B′ each has inserted within its upper end a sheet-metal plate a^{12}, Figs. 10, 14, and 15, arranged in the same plane with and entering at its edges into the folds which form the external

ribs, and the semicylindric parts constituting the cylindric side walls of the fork member are flattened down into close contact with the said plate at the extremities of the said parts, so that the end of the fork member becomes as a whole a flat projection formed of three thicknesses of metal, the same being suitably apertured for the reception of the securing-bolt. Obviously the flattening out of the tubular cylindric end of the fork member extends the same laterally, and the side edges of said extended portion are therefore trimmed off to a suitable width by means of a cutting-die or otherwise.

The construction of the crank-shaft hanger C is generally similar to that of the other fittings, the same being divided centrally into two sections, each made of swaged or drawn metal and having integral semicylindric projections, said sections being connected by seams which serve to secure the sections together and also to secure the frame members to the fitting. Said hanger consists generally of a barrel or body consisting of two sections C, each formed by drawing or swaging the central part of a sheet-metal blank into tubular form, this being usually done by means of suitable punching and drawing dies, so that each of the hangers is made circumferentially complete from a single metal blank. At the adjacent ends of said tubular part C are formed semicylindric projections C' C^2, having their longitudinal axes at right angles to the central axis of the tubular parts. Said semicylindric projections when the two parts of the hanger are placed together constitute tubular sockets for the reception of the ends of the frame-bar A^4 and the seat-post standard A^2. The said tubular parts C and socket members C' C^2 are provided with continuous outwardly-extending flanges c c', which on the tubular parts C in the drawings are lettered c and on the semicylindric parts C' C^2 are lettered c' c^2. The parts constituting the hanger are joined by the bending or seaming of said flanges together, and the frame members are joined to the sockets by the engagement of the notched ends of the flanges thereof with said sockets in the same manner as before described in connection with the fittings hereinbefore referred to.

For securing the horizontal rear-fork members A^5 A^5 to the hanger said hanger is provided with a lug or ear C^3, formed by means of two integral projections on the parts C C of the hanger, these parts being constructed in the same manner as the connection between the junction-piece B and the upper ends of the fork members A^6 A^6.

The lower ends of the upper rear-fork members A^6 A^6 and the rear ends of the horizontal members A^5 A^5 are also each flattened down and provided with an inserted metal piece and thereafter trimmed off at their marginal edges in the same manner as are the upper ends of the members A^6, the horizontal fork members being each provided with a chain-adjusting slot a^{13} and the ends of the upright members with apertures a^{14} for the reception of the rear-wheel bearings.

In Fig. 12 we have illustrated a slight modification in the construction of the lug B^2 of the upper junction-piece. In this instance, in lieu of the spacing-sleeve of the previously-described construction the side walls of the said lug are swaged inwardly into cylindric form around the bolt-aperture, so as to meet each other at their ends, and thus form a spacing sleeve or support.

A frame constructed in accordance with our invention may obviously be manufactured at a greatly-reduced cost, inasmuch as the parts thereof are made from sheet metal, which is much less expensive than drawn tubing, and the blanks of the several parts are of such form as to entail practically no waste in cutting the same. The operations of forming the several members may be performed with great economy, inasmuch as the work is principally done with swaging-dies. At the same time the frame produced is not only extremely neat and graceful in appearance, but is actually stronger than plain tubing of the same diameter, because the longitudinal radial ribs serve to strengthen the bars considerably, and these ribs are arranged in a vertical plane, by which they are best adapted to resist the strains brought upon the frame by the weight of the rider.

While we have herein shown a practical and what we deem to be a preferred embodiment of our invention, yet it will be obvious that various modifications may be made in the details thereof without departure from the spirit of the invention. We do not, therefore, desire to be limited to the precise details shown, except as the same is made the subject of specific claims.

The front forks of a bicycle may obviously be made in the same manner as the frame members hereinbefore described.

We claim as our invention—

1. A velocipede-frame comprising tubular frame members consisting of two sheet-metal parts each of semitubular form and provided with radially-extending marginal flanges interlocked to form a tubular structure and a fitting or junction piece provided with sockets which are adapted to receive the ends of the frame members, said frame members being secured in the sockets by means of interlocking projections and recesses on the said marginal flanges and sockets.

2. A velocipede-frame comprising frame members consisting of two semicylindrical sheet-metal parts provided one with two flat outwardly-extending flanges and the other with two flanges of greater width which are bent or folded around the flanges of the first-named member with their edges in contact with the side of the latter and a junction-piece provided with sockets to receive the ends of the frame member said frame members being secured in the sockets by inter-

locking projections and recesses on the said marginal flanges and sockets.

3. The combination with a frame member consisting of two sheet-metal parts joined by outwardly-extending flanges in the parts folded to form longitudinal seams, of a fitting or junction piece consisting of two sheet-metal parts joined by similar seams and having a socket to receive the end of the frame member; the seams of the frame member being inserted in and embraced by the seams of the fitting, and the seams of the frame member and fitting being provided with notches and recesses which are interlocked to hold the parts from endwise movement with relation to each other, substantially as described.

4. The combination with a frame member consisting of two sheet-metal parts joined by outwardly-extending flanges on the parts folded or seamed to form radially-projecting ribs, of a fitting or junction piece also consisting of two sheet-metal parts joined by similar seams and having a socket to receive the ends of the frame member, those portions of the radial frame-member ribs which are inserted within said socket being notched or reduced in width through portions of their lengths and the overfolding flange of the socket member being provided with corresponding apertures adapted to receive the unreduced portion of the ribs of the frame member when the parts are assembled, substantially as described.

5. A crank-hanger consisting of two tubular parts arranged in alinement with each other and having semicylindric projections on their adjacent ends, said parts being joined by flanges on the tubular and semicylindric parts, which flanges are interfolded or seamed together, substantially as described.

6. A seat-post fixture comprising two semicylindric parts provided each with a semicylindric projection adapted to form a tubular frame-bar socket, and also with lateral hollow projections adapted to form an attaching-lug, said semicylindric parts and the projections thereon being provided with outwardly-extending flanges which are interfolded or seamed together to permanently join the parts, substantially as described.

In testimony that we claim the foregoing as our invention we affix our signatures, in presence of two witnesses, this 13th day of May, A. D. 1896.

JAMES SPRUCE.
CHARLES HENRY KELLERMANN.

Witnesses:
DANIEL B. BENEDICT,
H. M. BALDWIN.