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Mesinger

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[54] **BICYCLE SEAT STRUCTURE**

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[52] **U.S. Cl.** **297/212;** 297/DIG. 2

[51] **Int. Cl.** **B62j 1/02**

[58] **Field of Search** ..... 297/195, 196, 197, 214, 297/212, 199, 200, 201, 202, 203, 207, 206, 205, 204, 215, DIG. 2

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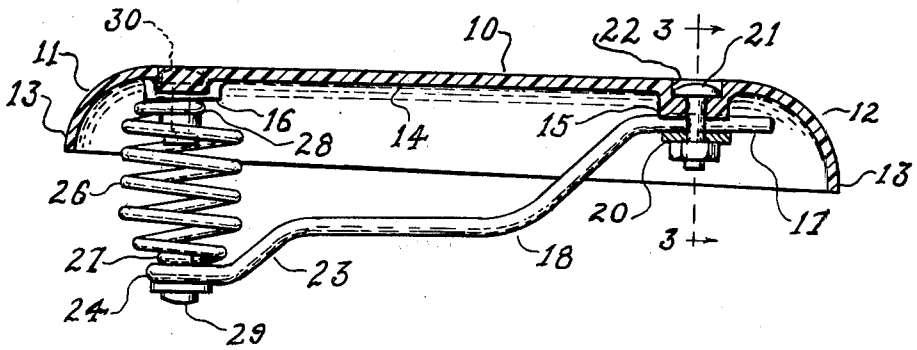
Attorney, Agent, or Firm—William F. Mesinger

[57] **ABSTRACT**

Instead of the stamped pressed metal base plate for a saddle seat, there is provided a base of similar general shape made of a semi rigid plastic material of a composition and character and thickness providing adequate stiffness to prevent exessive downward bending by the weight of a rider while allowing limited elastic downward deformation to accomodate rider comfort when the front and rear portions of the base plate are mounted on a frame in a manner that allows the base span (the distance between front and rear mounting points to contract when deformed and spring back to its original form when not loaded.

11 Claims, 16 Drawing Figures



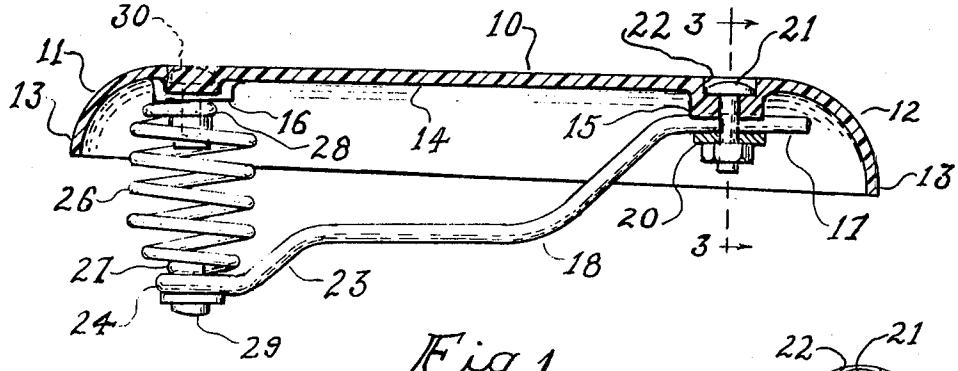


Fig. 1

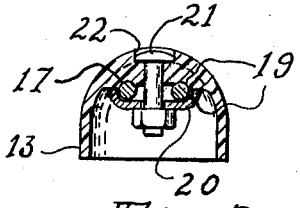


Fig. 3

Fig. 2

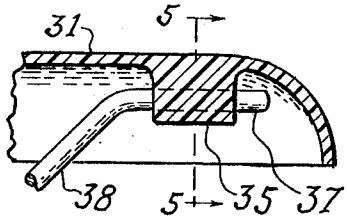


Fig. 4

Fig. 5

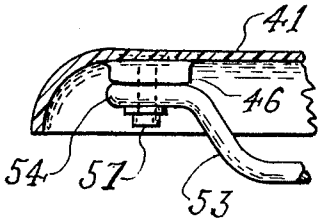


Fig. 8

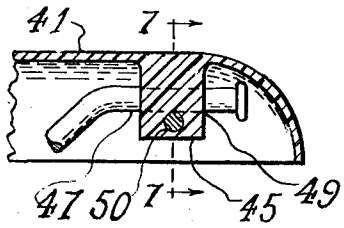


Fig. 6

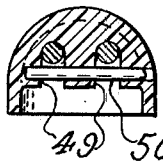


Fig. 7

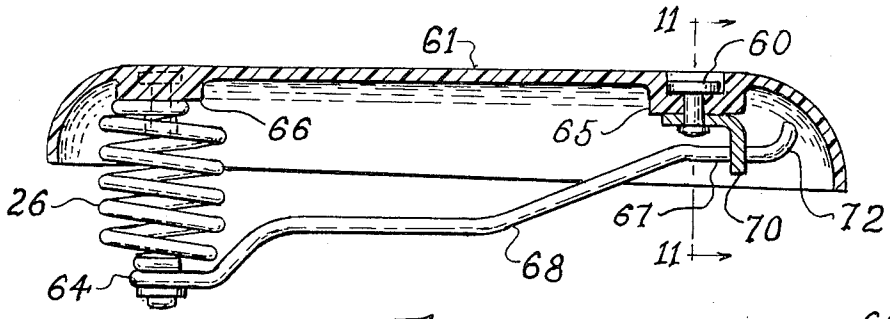


Fig. 9

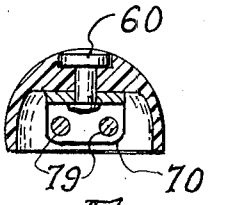


Fig. 11

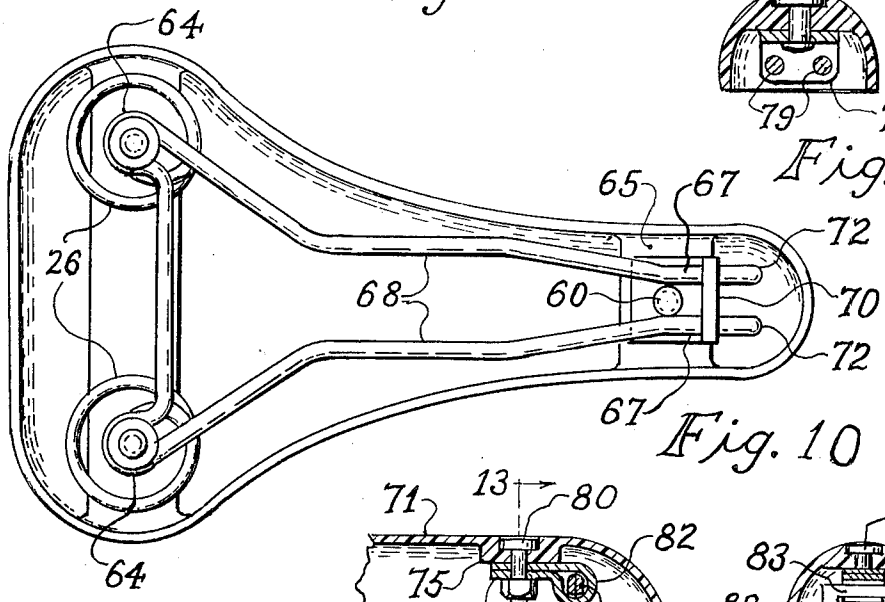


Fig. 10

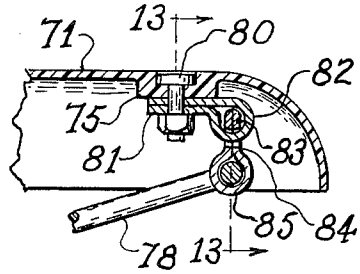


Fig. 12

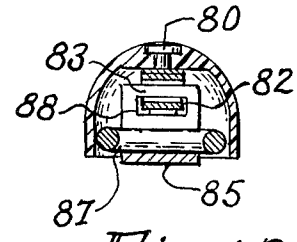


Fig. 13

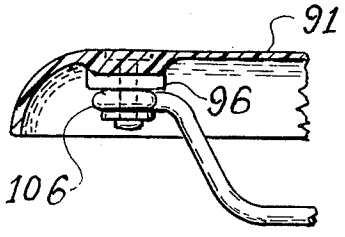


Fig. 16

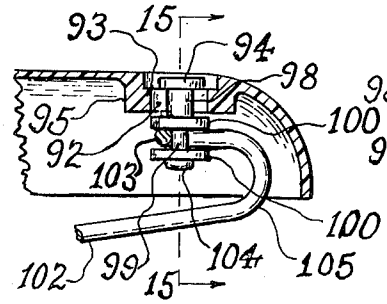


Fig. 14

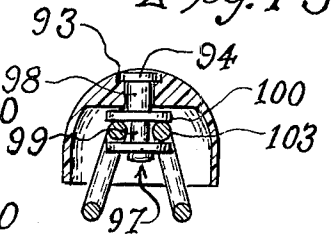


Fig. 15

BICYCLE SEAT STRUCTURE

BACKGROUND OF THE INVENTION

This invention relates to bicycle saddles and more specifically to the seating surface supporting undercarriage of saddles uncluding a base plate and the frame structure supporting the base plate for providing a saddle of lighter weight as well as greater rider comfort.

THE PRIOR ART

The undercarriage structure of bicycle saddles has included a rigid steel base plate supported on longitudinal truss members with front ends secured to the forward part of the base plate and rear portions secured to the rear parts of the base plate, sometimes the rear ends of the truss members are secured directly to the base plate but usually coil springs are interposed. Instead of a rigid base plate a set of mattress-like small coil springs is used for the seat supporting surface and then stiff stretcher bar members are provided with the front and rear ends fixedly secured to the seat supporting surface ends. Also instead of the pressed steel base plate a base plate formed of molded nylon plastic is provided with the forward and rearward ends of the truss members fixedly secured to the base plate. A rigid base does not yield to rider pressure and seating comfort is entirely dependent on the thickness of padding used. The mattress type seat supporting surface does resiliently yield and provides comfort but this construction is heavy and requires heavier metal frame structure. The steel base and mattress type saddles are considered to be too heavy for use on lightweight bicycles. The nylon plastic base made as a substitute for metal base does provide a somewhat lighter saddle.

SUMMARY OF THE INVENTION

Lighter weight of a bicycle saddle is obtained by making the base plate of a molded plastic material and by mounting the base plate on a frame structure, and mounting means having a minimum amount of heavy metal while greater rider comfort is attained by making the base plate material resilient in bending and its thickness such that the base plate yields to the weight of a rider a desired degree when the forward and rearward ends are so supported that the base is not restrained against lengthwise contractions when bowed by a load and resilient expansion when the load is removed. A formulation of plastic is chosen, for example a nylon composition when injection molded to form a base plate of a particular thickness provides the desired degree of resiliently deformable stiffness. Molded on the bottom of the base plate are transverse reinforcement thicknesses of material which permit the central areas of the base plate to be made of that thickness which, in conjunction with the resilience and stiffness of the material, provides the desired amount of yielding to a rider's weight. This plastic composition is not elastically stretchable but is resiliently bendable to a limited degree if not held stiff.

The base plate at these reinforcements is so mounted on a frame of lightweight construction that the base plate is not held stiffly in stretched condition but is permitted to contract and expand lengthwise so that it can resiliently yield the desired degree to a rider's weight. Such mounting structure includes fore and aftly extending truss members of strong steel and of the minimum size that provides adequate strength and stability,

and mounting means at the forward and or rearward ends that allows a limited degree of lengthwise relative movement of the base with respect to the truss members. When the rear ends of the truss members are directly mounted to the rear of the base, the mounting means may be constructed to provide the limited relative longitudinal movement while the front ends of the truss members are tightly secured to the front of the base. When coil springs connect the rear ends of the truss members to the base, the mounting means may provide the limited relative longitudinal movement. Preferably the truss members are immovably connected to the base at the rear and the mounting means for the forward portions provides the limited relative longitudinal movement.

Such mounting means is provided in or on the longitudinal passages in which the forward straight ends of the truss members are retained. The passages may be formed by a cover plate that bottoms on the reinforcement or the passages may be grooves and the truss ends retained by a cover plate or by a transverse pin. Or the passages may be holes in an angle member secured to the reinforcement. The mounting means can also be a swingable linkage or a headed bolt connected to the truss members and slideable in a slot hole in the reinforcement.

The front end truss to base plate securing structure provides, in addition to longitudinal sliding action that makes the resilient flexing of the base effective for rider comfort, it also allows a limited degree of lateral or side to side twist movement of the front end of the saddle. Such twist movement is permitted by the twisting of the front ends of the truss members within the passages in which they are held. Such twist movement provides rider comfort by allowing the saddle side skirt to move downward with pressure of the rider's leg when the adjacent leg is extended for the lowest part of the cranking stroke. Thus the saddle does not stiffly resist body movement, but follows body movement when the rider is pedalling. The truss members when secured by a seat post clamp to the bicycle have sufficient stiffness to resist twisting enough to limit rocking of the saddle to the angle desired for comfort.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a view of a longitudinal section of a saddle undercarriage with rear springs connecting the rear ends of the truss members to the base plate and showing front mounting means;

FIG. 2 is a bottom view of the undercarriage;

FIG. 3 is a view of a section taken on the line 3—3 in FIG. 1;

FIG. 4 is a view of a longitudinal section of the front portion of an alternative front mountnig means;

FIG. 5 is a view of a section taken on the line 5—5 in FIG. 4;

FIGS. 6 and 8 are views of longitudinal sections at the front and rear parts respectively showing alternative mounting means at front and rear reinforcements.

FIG. 7 is a view of a section taken on the line 7—7 of FIG. 6;

FIG. 9 is a view of a longitudinal section of another saddle according to the invention;

FIG. 10 is a bottom view of a saddle of FIG. 9;

FIG. 11 is a view of a section taken on the line 11—11 of FIG. 9;

FIG. 12 is a view of a longitudinal section of the front part of a saddle with another embodiment employing swingable linkage;

FIG. 13 is a view of a section taken on the line 13—13 of FIG. 12;

FIGS. 14 and 16 are views of longitudinal sections of front and rear parts respectively showing another embodiment of the invention; and

FIG. 15 is a view of a section taken on the line 15—15 of FIG. 14.

EMBODIMENTS OF THE INVENTION

In the drawing, FIGS. 1, 2 and 3 show a saddle undercarriage without a cushion padding and seating surface cover which on a finished saddle would be on top of and completely cover the top and sides of the base plate 10. The plastic base plate 10, hereafter described in specific detail, has the usual saddle shape with a wide rear end 11 and a narrow front end 12. The peripheral edges of the plate may have any of the contours that have been used in customary sheet metal base plates of prior saddles, the shape being chosen according to the manner of securing a top cover on the saddle. Preferrably the peripheral edges are formed downward as shown at 13. The depth of such edges 13 is chosen so that in cooperation with other factors the plate is neither too stiff nor too yieldable. The underside 14 also may have ribs or like formed thereon if desired, but not shown as not necessary for a stiffening effect although such rib formations may be an aid to flow of a plastic when the base plate is molded.

The base plate 10 on the underside has transverse reinforcements 15 and 16 near the front and rear ends which could be applied but are preferrably integrally molded on. Reinforcement 15 is thick enough and wide enough to provide a place for securing thereto the front end portions 17 of the longitudinal truss members 18. Likewise the rear reinforcements 16 are sized to provide places for securing means.

The truss members 18 preferably are formed of stiff steel wire stock to have parallel front portions 17 spaced to fit between the peripheral edges 13 and are held against the reinforcement 15 preferably in passages or grooves 19 formed by a retainer plate 20 which is secured by a bolt 21 that passes through a hole 22 in the plate and reinforcement 15. Preferrably the plate 20 does not bind the ends 17 of the truss but allows for a limited longitudinal sliding of the truss ends 17 in the passages 19 and therefore the plate 20 has edges which bottom on the reinforcement against which the plate 20 is held by the bolt 21 to provide the sliding clearance.

The truss members are shaped to provide mid portions 18 of the desired spacing and distance below the plate 10 for attachment of the customary seat post mounting clamps which are not shown, being not part of the invention. The rearward extending parts 23 spread laterally to end loops or eyes 24 for securing means. Herein the truss members are formed of a single bar to provide a transverse bridge member 25 connecting and stabilizing the truss ends. A stamped metal lighter-weight bridge member could be substituted.

The means securing the ends 24 of the truss to the reinforcements 16 may include 2 coil springs 26 having end eyes 27 and 28 for fastening as by rivets 29 and 30 to the truss eyes 24 and to the reinforcements 16, the rivets 30 passing thru suitable holes in the reinforcements.

The truss securing means thus provides that the base plate 10 is secured thereto against displacements in all lateral directions but not in the longitudinal direction. The longitudinal slippage provided at the forward securing means allows the span between the front and rear parts of the base to shorten when the midportions of the base plate are downwardly depressed so that there is no restraint to the resilient comfort providing action of the base plate which is formulated and constructed to provide such action. Thus with a light weight undercarriage having a solid base plate, the comfort action of the mattress type undercarriage is obtained.

The base plate of each of the embodiments is made of a plastic composition which has the finished properties in a predetermined thickness of baseplate to be resiliently deformable by downward pressure in amounts decreasingly greater by increases of pressure such that there is comfort action for all expected weights of riders but without sagging more than about one-half inch under the weight of the heaviest rider the bicycle is designed for. The formulation is also selected to have the property of always returning to original shape when pressure is removed so that the base plate shall not attain a permanent sag.

A preferred plastic composition is a "Nylon" formulation which is readily obtainable from producers. The base plate is preferably made by a molding process such as injection molding whereby the thickness of the plate can be accurately controlled. It is also contemplated that a base plate could be hot press formed from sheet material of the thickness and resilient properties, and the reinforcements secured thereunder by well known means such as cement and or rivets.

In FIGS. 4 and 5 is illustrated a very light weight construction at the front portion of the undercarriage wherein the reinforcement 35 on the underside of the plate 31 is made thick enough to have parallel longitudinal holes 39 formed through it and the forward end portions 37 of the truss members 38 are inserted slideably therein.

FIGS. 6, 7 and 8 illustrate another construction wherein reinforcement 45 has open grooves 49 through it, is thicker so that a transverse retaining pin 50 can be driven through it to retain the forwared ends 47 of the truss members. FIG. 8 shows the alternative construction for the rear securing means when coil springs are not used in order to provide a very light weight saddle. The rearward laterally extending portions 53 of the truss members are also curved upward so that the end eyes 54 may be bolted or riveted by fasteners 57 to the rear reinforcements 46. In this construction the eyes 54 need not be connected by a metal bridge member as in 25 of FIG. 2.

Another embodiment of the invention is illustrated in FIGS. 9, 10 and 11. This differs from that of FIGS. 1–3 mainly in the front securing means construction. The bottom of the plate 61 has reinforcements 65 and 66, the rear eyes 64 being connected through springs 26 to the reinforcements 66. To the front reinforcement 65 by rivet 60, is secured an angle piece 70 the downward leg of which has two holes 69 through it which receive the forward end parts 67 of the truss members 68.

The front parts 67 of the truss members may if desired, have means thereon to limit the amount of relative sliding movement, one such being shown as sharp upward end bends at 72. In addition to sliding, this con-

struction allows hinge action for unrestrained bending of the plate and for action of the springs.

It is also contemplated that the longitudinal sliding action may occur at the rear securing means. For example the front ends of the truss members may be formed into a loop which is bolted to the front reinforcement and the rear ends of the truss members may have substantially straight portions which are inserted each through a hole in a respective ell shaped angle pieces similar to the angle piece **70** of FIG. **9** such angle pieces being riveted to the rear reinforcements. Such construction also provides longitudinal freedom for the resilient comfort action of the plastic base plate.

Another construction providing hinge action as well as relative longitudinal movement is shown in FIGS. **12** and **13.** The reinforcement **75** has secured to it by bolt **80,** a hinge member **81** having a loop portion **82** in which there swings cross members **83** of a depending hinge **84.** The depending hinge **84** has its lower part **85** looped around a transverse end part **87** of the truss **78** which end part joins the forward ends of the truss **78.** The upward plates of hinge **84** have cut-out slots **88** so as to form the cross member **83.** The hinge **84** is assembled on the transverse end part **87,** closed up, and the hinge member **81** is assembled on the cross members **83** and then is closed and bolted to the reinforcement **75.**

In the embodiment of FIGS. **14, 15** and **16,** the sliding action in the truss mounting means is provided by having the hole **92** in reinforcement **95** of plate **91** slotted or elongated lengthwise and countersunk to receive the head **94** and provide a shoulder **93** to retain the head **94** in sliding engagement. The head **94** is on a special bolt or rivet **97** having a neck **98** of a length passing through the slot **92** and ending in a smaller diameter portion **99** which carries retaining washers **100** between which is secured a front end loop or eye **103** of the truss members **102,** the eye being clamped tightly between washers **100** by heading the rivet at **104.** In this construction the truss ends do not slide but the special rivet **97** slides in the slot **92.**

The truss members **102** may have front ends extending forwardly to the rivet **97** and joined by a loop **103** or as shown, the forward part of the truss members may extend beyond the securing means and have return bends **105** to the rivet **97** and joined by the loop **103.** Such bend formation can be designed to provide a small amount of spring action. The rear parts of the truss members may be upwardly directed so that the end eyes **106** can be bolted or rivetted to reinforcements **96.** Alternatively the rear parts of the truss members **102** may be downwardly directed so that the end eyes **106** can be secured to coil springs as in FIG. **1.**

I claim:

1. A bicycle seat structure comprising:

a longitudinally extending base plate having a wide rearward portion and a narrow forward portion, the distance between the longitudinal ends of said portions defining an unstressed for and aft span;

a longitudinally extending undercarriage having a rear part and a front part;

rear means connecting said rearward portion to said rear part; and

front means connecting said forward portion to said front part;

one of said means enabling free relative longitudinal movement of the base plate and the undercarriage;

said base plate being substantially unstretchable and resiliently deformable to enable limited desired resilient flexing;

one of said means operatively connecting said base plate and undercarriage in a manner enabling free shortening and lengthening of said fore and aft span under loading and unloading forces, respectively, on the base plate produced by the rider of the bicycle, the base plate returning to its full length unstressed fore and aft span when unloaded when the rider dismounts.

2. A bicycle seat structure in accordance with claim **1** and wherein said base plate and said undercarriage are separate parts and said base plate has integrated therewith a peripheral edge extending downwardly to affect the desired compliance of the base plate.

3. A bicycle seat structure in accordance with claim **1** and wherein said front means enables longitudinal movement of the forward portion of the base plate with respect to the rearward portion thereof.

4. A bicycle seat structure in accordance with claim **1** and wherein said undercarriage includes two elongated truss members, their rear parts being directly fixedly connected to said wide rearward portion of said base plate by said rear means and their front parts being slideably received by said front means.

5. A bicycle seat structure in accordance with claim **1** and wherein said rear means includes two springs connected to and depending from said wide rearward portion of said base plate and wherein said undercarriage includes two elongated truss members, their rear parts being directly fixedly connected to the bottoms of their respective springs, and their front parts being slideably received by said front means thereby enabling longitudinal movement of said forward portion of the base plate with respect to the rearward portion thereof.

6. A bicycle seat structure in accordance with claim **2** and wherein a rearward reinforcement and a forward reinforcement depend from said rearward portion and said forward portion of the base plate, respectively, and extend transversely between respective portions of said peripheral edge.

7. A bicycle seat structure in accordance with claim **6** and wherein said rear means includes two springs connected to and depending from said wide rearward portion of said base plate and wherein said undercarriage includes two elongated truss members, their rear parts being directly fixedly connected to the bottoms of their respective springs, and wherein said front means includes said forward reinforcement which has open bottom passages extending longitudinally on each side of the longitudinal center line thereof, and said front means includes a retainer plate slideably holding said truss members in said passages, their front parts extending through said passages and terminating therebeyond.

8. A bicycle seat structure in accordance with claim **6** and wherein said undercarriage includes two elongated truss members, their rear parts being directly fixedly connected to said wide rearward portion of said base plate by said rear means and their front parts being slideably received by said front means; and wherein said front means includes said forward reinforcement which has open bottom passages extending longitudinally on each side of the longitudinal centerline thereof, and said front means includes a retainer plate slideably holding said truss members in said pas-

sages, their front parts extending through said passages and terminating therebeyond, the side edges of said retainer plate bottoming on said forward reinforcement.

9. A bicycle seat structure in accordance with claim **6** and wherein said forward reinforcement has parallel longitudinal holes, and wherein said undercarriage includes two elongated truss members, the front ends of which slideably extend through their respective holes.

10. A bicycle seat structure in accordance with claim **6** and wherein said forward reinforcement has a countersunk hole therethrough, a rivet fixedly seated in said countersunk hole, said front parts of the truss members being hingedly connected to the bottom of the rivet.

11. A bicycle seat structure in accordance with claim **6** and wherein said forward reinforcement has a countersunk longitudinal hole therethrough, a rivet seated in said countersunk hole for longitudinal sliding movement therein, said front parts of the truss members being fixedly connected to the bottom of said rivet.

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