

Jan. 16, 1940.

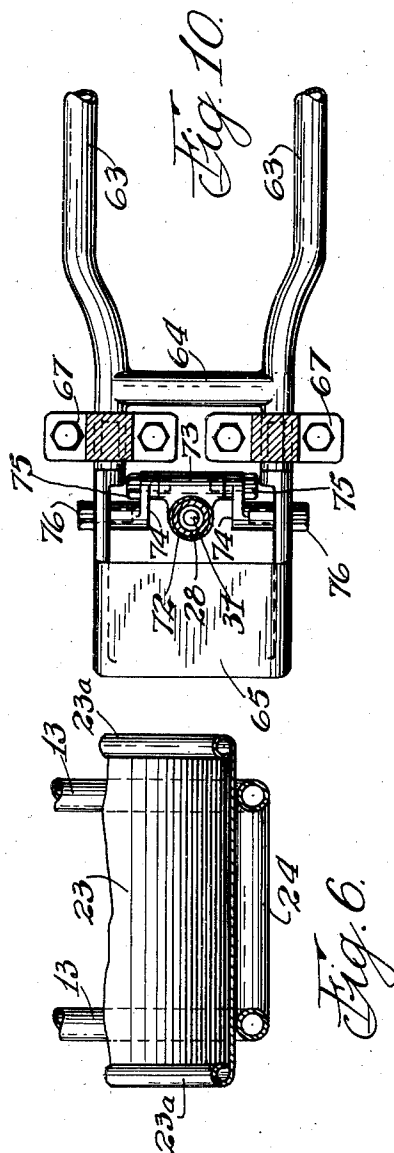
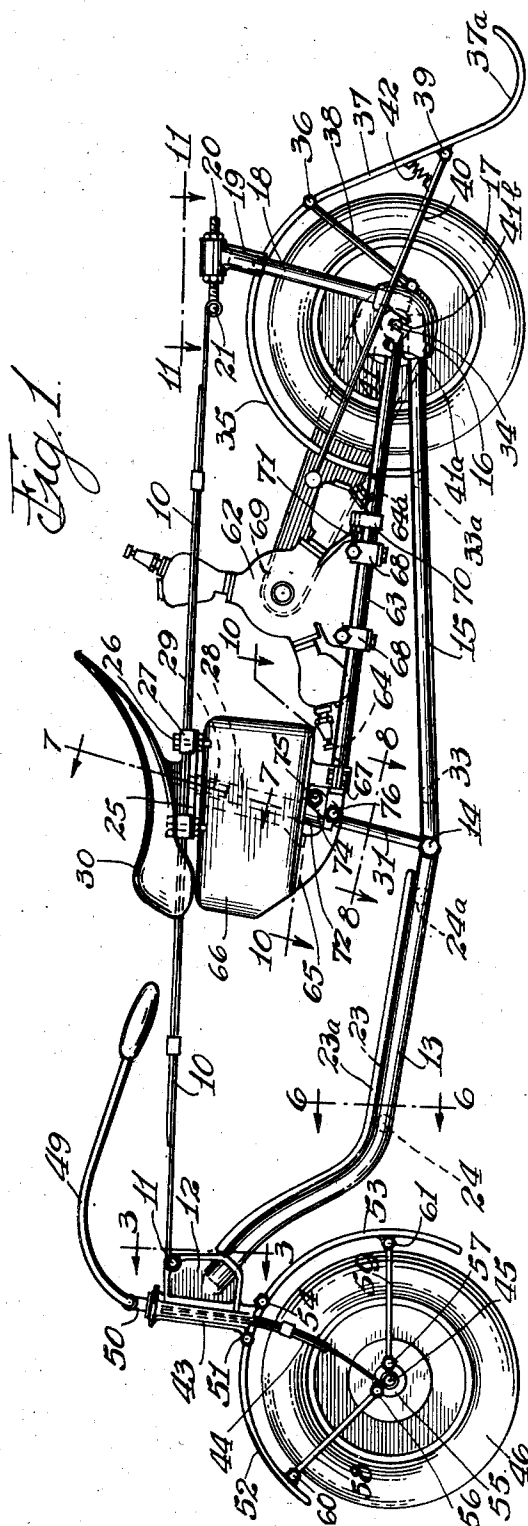
T. P. JUDD

2,187,238

MOTORCYCLE AND THE LIKE

Filed Dec. 18, 1936

3 Sheets-Sheet 1



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3 Sheets-Sheet 2

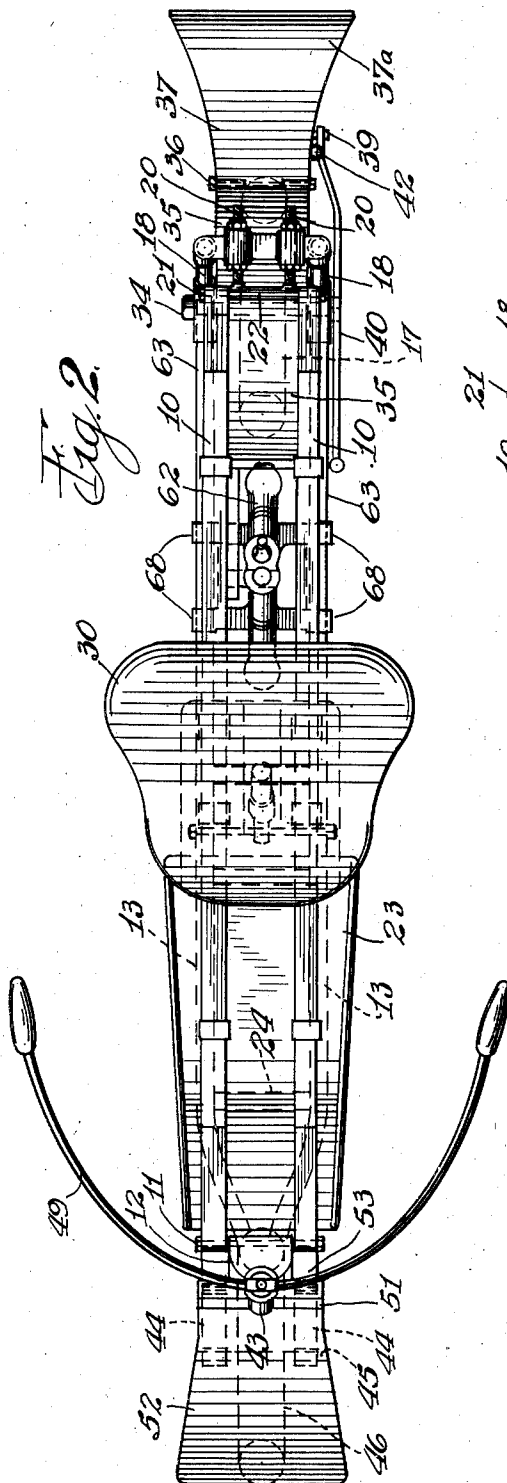


Fig. 2.

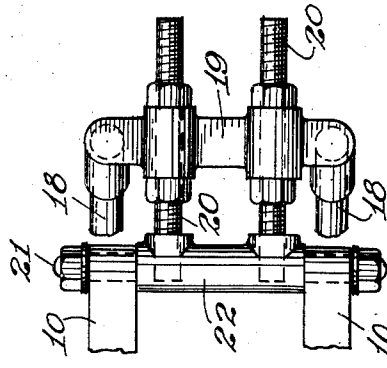


Fig. 11.

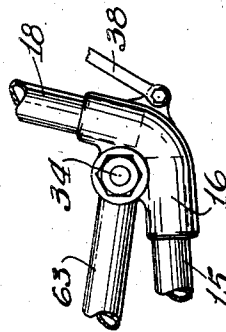


Fig. 9.

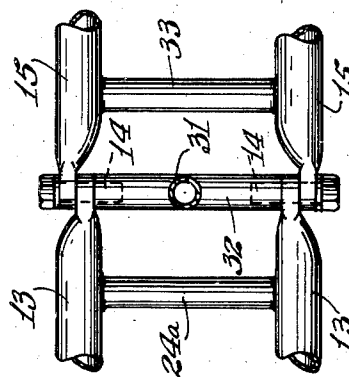


Fig. 8.

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3 Sheets-Sheet 3

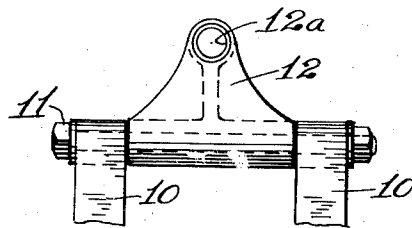
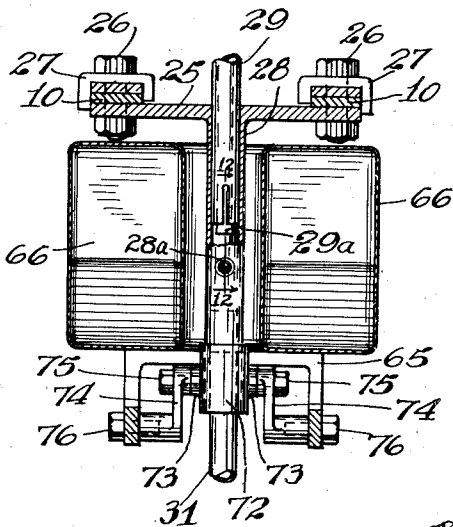
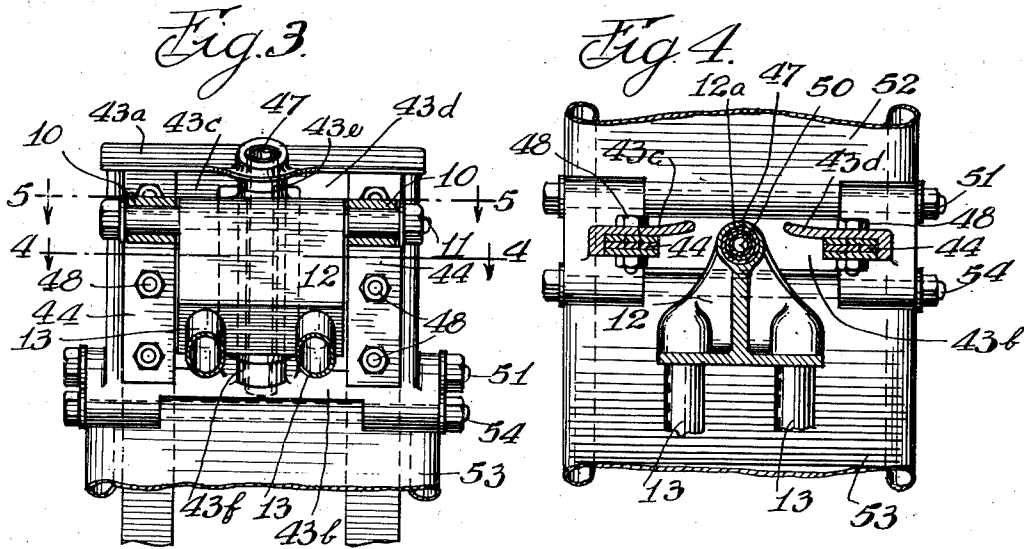


Fig. 5.

Fig. 7.

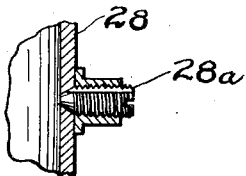


Fig. 12.

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UNITED STATES PATENT OFFICE

2,187,238

MOTORCYCLE AND THE LIKE

Trenor P. Judd, Cairo, Ill.

Application December 18, 1936, Serial No. 116,452

10 Claims. (Cl. 180—30)

My invention consists of an improved construction of motorcycles and the like, by which the frame is built in a manner to yield vertically under load or road impacts, to cushion the rider and also the parts of the machine, to any desired degree, without the use of additional springs and without in any way sacrificing lateral stability and strength of the frame. By my construction I am able to materially simplify and cheapen the manufacture of the structure, at the same time producing a machine that is effective, strong and durable.

More specifically, the frame of my machine consists of upper spring members spaced laterally from each other and connected at their ends with the head of the frame and with vertical and laterally spaced rear members of the frame, said spring members preferably comprising flat springs of such cross section as to serve as upper compression members of the frame and also as vertically yieldable members by which the cushioning referred to is secured, the seat of the machine being carried by the mid-portions of said springs. The frame further consists of lower and laterally spaced member portions extending downwardly and rearwardly from the head and pivotally connected at their rear ends below said seat, with the front ends of lower and laterally spaced horizontal member portions extending rearwardly and rigidly connected with the lower ends of said vertical members. As a result, the lower member portions of the frame may move relatively to each other on said pivotal connections for vertical deflection of said spring members, and so avoid developing strains in the frame due to said deflection. To stabilize the support of said seat, I prefer to connect said support with a downwardly extending tubular member in which a rod extending upwardly from said pivotal connections, telescopes with a sliding fit. When used with a motorcycle, I preferably provide my machine with an engine supporting frame comprising laterally spaced horizontally extending members pivotally connected at their rear ends with the junctions of said vertical members and said horizontal member portions, and extending forwardly above said horizontal member portions, to substantially said tubular member where they are connected with said tubular member by links to permit adjustment of the main frame and its spring members and compensate for angularity of said engine supporting frame, and so prevent the development in any of said parts of strains due to deflection of said spring members. The engine supporting frame is

thus suspended from said spring members and effectively cushioned thereby against road shocks.

The above and other novel features of my invention more fully appear in connection with the accompanying drawings illustrating a preferred embodiment thereof, in which

Fig. 1 shows my machine in side elevation,

Fig. 2 is a plan view of the structure shown in Fig. 1,

Fig. 3 is a vertical, sectional view to an enlarged scale of a part of the structure shown in Fig. 1, taken along the line 3—3,

Fig. 4 is a horizontal sectional view of the structure shown in Fig. 3, taken along the line 4—4,

Fig. 5 is a plan view of the head and attached springs removed from the fork structure of the vehicle, this view being taken along the line 5—5 in Fig. 3,

Fig. 6 is a vertical, sectional view to an enlarged scale, of the lower and forward part of the main frame shown in Fig. 1, taken along the line 6—6,

Fig. 7 is a vertical, sectional view to an enlarged scale, of a part of the structure shown in Fig. 1, taken along the line 7—7,

Fig. 8 is a horizontal, sectional view to an enlarged scale, of a part of the structure shown in Fig. 1, taken along the line 8—8,

Fig. 9 shows in side elevation to an enlarged scale, the junction of one of the lower, horizontal frame member portions with the corresponding vertical frame member, and the pivotal connection thereto of one of members of the engine supporting frame,

Fig. 10 is a horizontal, sectional view to an enlarged scale, of a part of the structure shown in Fig. 1, taken along the line 10—10,

Fig. 11 shows in plan view and to an enlarged scale, the connecting mechanism employed between the upper ends of the vertical frame members and the rear ends of the spring members shown in Fig. 1, this view being taken along the line 11—11 in Fig. 1, and

Fig. 12 is a vertical, sectional view to an enlarged scale, of a part of the structure shown in Fig. 7, taken along the line 12—12.

Similar numerals refer to similar parts throughout the several views.

As shown in Fig. 1, the main frame of the machine consists of upper and horizontally disposed spring members 10, preferably of flat spring steel, which, as shown in Fig. 2 are laterally spaced from each other, which are pivotally connected at their front ends at 11, with the frame head 12

of the machine. Lower and laterally spaced frame members include front portions 13 which are rigidly secured to the head 12 and extend downwardly and rearwardly therefrom and at their rear ends are pivotally connected at 14 with the front ends of rear portions 15 of said lower frame members. The rear ends of the member portions 15 are rigidly secured to connection members 16, one on either side of the rear wheel 17, which connection members are also rigidly secured to the lower ends of the laterally spaced vertical frame members 18. The upper ends of the members 18 are rigidly secured to a connection member 19 through which adjusting screws 20 extend to pivotally support the rear ends of the springs 10 at 21. As shown in Fig. 11, the front ends of the screws 20 are rigidly secured to a cross bar 22 which in turn is rigidly secured to the pivot studs 21 to afford stable lateral support for the rear ends of the springs 10.

As shown in Fig. 6, the frame portions 13 support a plate 23 of sheet metal secured to said frame portions 13 in any desired manner, for example, by riveting, brazing, welding or equivalent means, said plate being provided with a rolled edge flange 23a to stiffen said plate and retain the feet of the rider thereon. The plate 23 constitutes a reinforcing member for the frame portions 13, and also a platform to support the feet of the rider. In Fig. 6 there is also shown, a lateral strut 24 between the frame portions 13 and rigidly secured thereto, for example, by brazing or welding, there being another of said struts between said members and similarly connected thereto, as indicated at 24a in Fig. 1.

As shown in Fig. 7, the springs 10 have secured to their mid-portions, a sheet metal plate 25, by bolts 26 and clips 27. The mid-portion of the plate 25 has rigidly secured thereto and extending downwardly therefrom, a tubular member 28, the bore of which is continued through the plate 25, to receive the post 29 of the seat 30 shown in Fig. 1, said post as shown in Fig. 7 having an expanding device 29a at its lower end to rigidly secure said post in said tubular member 28 in any desired position.

As shown in Fig. 7, a lower tubular member or rod 31 telescopes into the lower end of the tubular member 28 with a sliding fit, which member 31 is rigidly secured at its lower end to the pivot studs 14 (Figs. 1 and 8), to afford stable support laterally for the seat post 29, and at the same time to permit the seat 30 and mid-portions of the springs 10 to move freely vertically relatively to the pivot studs 14, to support the weight of the rider and to cushion road impacts that may be exerted on the head 12 and on the connection members 16 (Fig. 1). As more clearly shown in Fig. 12, the tubular member 28 is provided with an adjustable air vent 28a, constituting the structure a shock absorber.

As shown in Fig. 8, the adjacent overlapping ends of the frame portions 13 and 15 are flattened and engage each other, said flattened ends having apertures therethrough to receive the pivot studs 14 with a sliding fit, which studs are secured to a cross bar 32 to the mid-portion of which the lower end of the member 31 is rigidly secured. In Fig. 8 there is also shown a cross bar or tube 33 rigidly connecting the front portions of the frame portions 15 to brace the same laterally. As indicated in Fig. 1, a similar cross bar or tube 33a is similarly connected to the frame portions 15 just in front of the wheel 17.

As shown in Fig. 9, the connection member 16

has secured thereto one end portion of a shaft 34 extending through the rear wheel 17, the other end portion of said shaft being similarly connected with the similar connection member on the other side of the machine, to support the frame on said wheel 17 and permit free rotary movement of said wheel.

As shown in Fig. 1, a sheet metal mud-guard 35 extends around and spaced from the wheel 17, from the rear cross bar 33a to and beyond the connection member 19, to which cross bar and connection member it is rigidly secured, said mud-guard being of a width substantially equal to the space between the frame portions 15, and of sufficient thickness to substantially reinforce the frame portions 15 and the frame members 18 and hold them rigidly in the position relatively to each other illustrated in the drawings. The rear end of the mud-guard 35 is pivotally connected at 36 with the upper end of a movable mud-guard 37 extending in its lower position to engage the road surface, to constitute a supporting stand for the machine, the lower end portion of the section 37 being preferably curved as indicated at 37a in Fig. 1 to afford ample supporting surface for said stand, said lower end portion 37a, as shown in Fig. 2, being preferably substantially wider than the upper portion of the mud-guard 37, to impart substantial lateral stability to the stand. A bracing rod 38 is connected at its upper end to each end of the pivot 36, (Fig. 1), the lower end of said rod being connected to the corresponding connection member 16, (Figs. 1 and 9). As shown in Fig. 1, the stand member 37 is pivotally connected at 39 with the rear end of an operating rod 40 which extends forwardly to be within reach of the rider, which rod 40 is provided with a downwardly extending retaining plate 41 above the shaft 34, having notches 41a and 41b for engaging the end portion of the shaft 34 which is extended for that purpose, so that when the notch 41b is in engagement with the shaft 34 as shown in Fig. 1, the stand member 37 is in its lower position to support the machine in upright position from the road surface, and when the notch 41a is in engagement with said shaft, the stand member 37 is raised to clear the road for riding purposes. A spring 42 is supported between the stand member 37 and the rod 40, to press the plate 41 downwardly as far as the one of the notches 41a and 41b engaging the shaft 34 will permit, to hold the stand member 37 until it is desired to shift said stand member to its alternate position, which is done by raising the rod 40 against the action of the spring 42, and then moving said rod longitudinally.

As shown in Fig. 1, the head 12 of the frame engages a fork head 43 from which fork springs 44 preferably of flat spring steel, extend downwardly for connection at their lower ends with the end portions of a shaft 45 extending through the front wheel 46 of the machine, upon which shaft said front wheel is freely rotatable.

As shown in Fig. 3, the fork head 43 consists of upper and lower transverse members 43a and 43b connected by integral vertical members 43c and 43d of angular cross section, said fork head, as well as the frame head and connection members described, being preferably metal castings, forgings or stampings. The transverse members 43a and 43b are provided at their mid-portions, with bosses 43e and 43f extending towards each other and engaging with a sliding fit the upper and lower surfaces of the frame head 12.

As shown in Fig. 5, the head 12 is provided

through its front portion, with a vertical tube 12a of metal adapted to withstand wear, for example, steel or bronze, which is a tight fit in a bore therefor in said head and extends from the top to the bottom surface thereof. As shown in Fig. 4, in the assembled machine, a tube 47 of suitable metal, for example, steel, extends with a free turning fit through the tube 12a, and also through bores therefore in the mid-portions of the transverse fork members 43a and 43b and the corresponding bosses 43e and 43f, in which bores the tube 47 is a tight fit. A free turning connection between the fork head 43 and the frame head 12 is thus effected for steering purposes, the connection being of sufficient strength to carry the load on the machine and to withstand all road shocks to which the front wheel 46 is ordinarily subjected in use.

As shown in Fig. 4, the fork springs 44 extend upwardly through the lower transverse fork member 43b and into the angles in the vertical fork members 43c and 43d, said springs preferably extending as shown in Fig. 3, so that their upper ends rest against the lower surface of the transverse fork member 43a, in which position the upper portions of said springs are rigidly secured by bolts 48 extending through said springs and through the vertical fork members 43c and 43d.

As shown in Figs. 1 and 2, the machine is provided with handle bars 49 for steering purposes, from which a central vertical tube 50 (Fig. 1), extends downwardly with a sliding fit into the fork tube 47, said tube 50 being preferably provided at its lower end with a suitable expanding device similar to that shown for the seat post 29, to tightly secure the handle bars 49 to the fork tube 47 in any desired adjustment.

As shown in Figs. 1 and 2, the lower transverse member of the fork head 43, has pivotally connected with its front edge at 51, the rear end of a first and forwardly extending mud-guard section 52 above the wheel 46, and the upper end of a second and downwardly extending mud-guard section 53 back of the wheel 46, is similarly pivotally connected to the rear edge of said transverse fork member at 54. Each end of the shaft 45 adjacent the lower end of the corresponding fork spring 44, has rigidly secured thereto, a metal disk 55, each of which disks as seen for the one thereof shown in Fig. 1, has pivotally secured thereto at 56 and 57, one end of each of the bracing rods 58 and 59, the other ends of which rods are pivotally connected at 60 and 61 with the mud-guard sections 52 and 53 respectively. The mud-guard sections 52 and 53 are preferably provided with rolled reinforcing edges, and made of sheet steel of sufficient thickness to prevent twisting of the wheel 46 relatively to the fork head 43, without in any way interfering with deflection of the springs 44 in carrying the load on the machine, or cushioning road shocks exerted on the wheel 46.

The structure thus far described may be used effectively with any type of two-wheeled vehicle in which the wheels are in the same plane for straight-away movement, regardless of whether it is to be driven by foot power or by an engine. The parts described, as a result of their disposition and relation to each other, constitute a frame which is flexible and resilient vertically at its mid-portion, but which is at the same time strong and rigid laterally, longitudinally and torsionally, which frame is effectively supported on the wheels of the vehicle, the latter being provided by said structure, with a front fork of resilient construc-

tion permitting the front wheel to vibrate vertically relatively to the frame with a degree of readiness determined by the stiffness of the fork springs. Said structure also provides a front fork construction which, although resilient as described, is laterally and torsionally stiff and insures satisfactory functioning of the structure in use.

When the structure described is to be driven by an engine, I prefer to support the engine illustrated at 62 in Fig. 1, on an engine supporting frame consisting of laterally spaced horizontal members 63, each pivotally mounted at its rear end on the corresponding end portion of the shaft 34. The frame members 63 are rigidly connected with each other by cross members 64 and 64a, to impart rigidity to the engine supporting frame. The front ends of the members 63 have rigidly secured to them, a bracket 65 supporting a fuel tank 66, the rear portion of which is divided to span the tubular member 28, the rear portion of the bottom of the tank having rigidly attached thereto, clamps 67 by which the tank is connected to the front end portions of the frame members 63. The engine 62 is secured to the frame members 63 by clamps 68 attached to the base of the engine. A chain 69 extends from the engine to the rear wheel 17 to drive the latter. Blocks 70 are mounted on the frame members 63 in front of and resting against the cross member 64a, said blocks having adjusting screws 71 extending forwardly from them into engagement with the rear clamps 68, by which screws the engine may be moved forwardly on the frame members 63 from time to time, to take up wear on the chain 69.

As shown in Fig. 7, the lower end of the tubular member 28 extends into a connecting member 72 to which it is rigidly secured. The member 72 has extending laterally therefrom, opposite bosses 73, 73, to which the upper ends of links 74, 74, are pivotally connected at 75, 75, the lower ends of said links being pivotally connected at 76, 76, with the side members of the rear part of the bracket 65. The relation of the parts last described is also shown in Fig. 10. In this manner the front end of the engine supporting frame is supported by the tubular member 28 and so by the springs 10, and a cushioned support is provided for the engine 62 and the tank 66.

The member portions 13 and 15, and the members 18, 28 and 63 and the cross members or struts 24, 24a, 33, 33a, 64 and 64a are preferably made of steel tubes and the parts are secured together, unless otherwise described, preferably by brazing or welding.

The structure described is simple and cheap to construct, and at the same time is strong and effective in use, besides affording a high degree of comfort and protection against road shock. Additional devices commonly used on vehicles of the kind described, such as brakes, starting devices, engine controlling devices, as well as accessories of various kinds, are not shown or described, since they are well known and are of standard construction of various makes, and may be incorporated in the structure described, to suit the preference of the individual manufacturer.

While I have shown my invention in the particular embodiment above described, it will be understood that I do not limit myself thereto, as I may employ equivalents of the parts described without departing from the scope of the appended claims.

What I claim is:

1. In a vehicle of the class described, the combination of a rear main-frame portion including horizontal lower members and vertical members rigidly secured at their lower ends to the rear ends of said horizontal lower members respectively, a front main-frame portion including a frame head and members rigidly secured thereto and extending downwardly and rearwardly and pivotally connected at their rear ends with the front ends of said horizontal lower members, horizontal and longitudinally extending spring members connecting the upper ends of said vertical members with said frame head, a tubular member secured to the mid-portions of said spring members and extending downwardly and towards said pivotal connections, a rod extending upwardly from said pivotal connections and into the lower end of said tubular member with a sliding fit, a front fork having an upper fork member extending vertically through said head for turning movement therein, front and rear wheels pivotally connected respectively with said front fork and said rear main-frame portion, a seat supported by said spring members, and a steering handle secured to the upper member of said front fork.

2. In a vehicle of the class described, the combination of a rear main-frame portion including horizontal lower members and vertical members rigidly secured at their lower ends to the rear ends of said horizontal lower members respectively, a front main-frame portion including a frame head and members rigidly secured thereto and extending downwardly and rearwardly and pivotally connected at their rear ends with the front ends of said horizontal lower members, horizontal and longitudinally extending spring members connecting the upper ends of said vertical members with said frame head, a tubular member secured to the mid-portions of said spring members and extending downwardly and towards said pivotal connections, a rod extending upwardly from said pivotal connections and into the lower end of said tubular member with a sliding fit, a front fork having an upper fork member extending vertically through said head for turning movement therein, front and rear wheels pivotally connected respectively with said front fork and said rear main-frame portion, a seat supported by said spring members, a steering handle secured to the upper member of said front fork, an engine-supporting frame pivotally connected with and extending above said lower horizontal members, and a link pivotally connecting the front end of said engine frame with the lower portion of said tubular member.

3. In a vehicle of the class described, the combination of a rear main-frame portion including horizontal lower members and vertical members rigidly secured at their lower ends to the rear ends of said horizontal lower members respectively, a front main-frame portion including a frame head and members rigidly secured thereto and extending downwardly and rearwardly and pivotally connected at their rear ends with the front ends of said horizontal lower members, horizontal and longitudinally extending spring members connecting the upper ends of said vertical members with said frame head, a tubular member secured to the mid-portions of said spring members and extending downwardly and towards said pivotal connections, a rod extending upwardly from said pivotal connections and into the lower end of said tubular member with a sliding fit, a

front fork having an upper fork member extending vertically through said head for turning movement therein, front and rear wheels pivotally connected respectively with said front fork and said rear main-frame portion, a seat supported by said spring members, a steering handle secured to the upper member of said front fork, and adjusting devices connecting the rear ends of said spring members with the upper ends of said vertical members.

4. A main frame for a vehicle of the class described, including a head, a wheel shaft, first laterally spaced lower frame members rigidly secured to said head and extending therefrom to said shaft, said first frame members each including front and rear portions connected at their adjacent ends, second laterally spaced and vertically extending frame members rigidly secured to the rear ends of the rear portions of said first frame members and extending upwardly from said shaft, third laterally spaced upper frame members extending horizontally from said head to the upper ends of said second frame members and comprising flat and laterally spaced metal springs imparting vertical resistance and lateral stability to the frame, and adjusting means for said third frame members including screws extending in the direction of said third frame members and connecting the latter with said second frame members, and devices for rigidly securing said screws in adjusted position to said second frame members.

5. A main frame for a vehicle of the class described, including a head, a wheel shaft, first laterally spaced lower frame members rigidly secured to said head and extending therefrom to said shaft, said first frame members each including front and rear portions connected at their adjacent ends, second laterally spaced and vertically extending frame members rigidly secured to the rear ends of the rear portions of said first frame members and extending upwardly from said shaft, third laterally spaced upper frame members extending horizontally from said head to the upper ends of said second frame members and comprising flat and laterally spaced metal springs imparting vertical resilience and lateral stability to the frame, and pivotal connections between the ends of said third frame members and said head and said second frame members respectively, the front and rear portions of said first frame members being pivotally connected with each other on horizontal axes.

6. A main frame for a vehicle of the class described, including a head, a wheel shaft, first laterally spaced lower frame members rigidly secured to said head and extending therefrom to said shaft, said first frame members each including front and rear portions connected at their adjacent ends, second laterally spaced and vertically extending frame members rigidly secured to the rear ends of the rear portions of said first frame members and extending upwardly from said shaft, third laterally spaced upper frame members extending horizontally from said head to the upper ends of said second frame members and comprising flat and laterally spaced metal springs imparting vertical resilience and lateral stability to the frame, pivotal connections between the ends of said third frame members and said head and said second frame members respectively, the front and rear portions of said first frame members being pivotally connected with each other on horizontal axes, a tubular member secured to and extending downwardly

from the mid-portions of said third frame members, and a rod extending upwardly from the pivotal connections of said first frame member portions and telescoping with a sliding fit in said tubular member.

7. A main frame for a vehicle of the class described, including a head, a wheel shaft, first laterally spaced lower frame members rigidly secured to said head and extending therefrom to said shaft, said first frame members each including front and rear portions connected at their adjacent ends, second laterally spaced and vertically extending frame members rigidly secured to the rear ends of the rear portions of said first frame members and extending upwardly from said shaft, third laterally spaced upper frame members extending horizontally from said head to the upper ends of said second frame members and comprising flat and laterally spaced metal springs imparting vertical resilience and lateral stability to the frame, a wheel between the rear portions of said first frame members and between said second frame members and rotatable around said shaft, and a stiffening plate spaced from said wheel and secured to the rear portions of said first frame members and to said second frame members, said plate being of a width equal substantially to the spacing of said frame members from each other respectively and being of sheet metal of a thickness sufficient to impart lateral stability to said frame.

8. A main frame for a vehicle of the class described, including a head, a wheel shaft, first laterally spaced lower frame members rigidly secured to said head and extending therefrom to said shaft, said first frame members each including front and rear portions connected at their adjacent ends, second laterally spaced and vertically extending frame members rigidly secured to the rear ends of the rear portions of said first frame members and extending upwardly from said shaft, third laterally spaced upper frame members extending horizontally from said head to the upper ends of said second frame members and comprising flat and laterally spaced metal springs imparting vertical resilience and lateral stability to the frame, and an engine supporting frame including fourth laterally spaced members pivotally connected at their rear ends with said shaft and supported at their front ends from the mid-portions of said third frame members.

9. A main frame for a vehicle of the class described, including a head, a wheel shaft, first lat-

erally spaced lower frame members rigidly secured to said head and extending therefrom to said shaft, said first frame members each including front and rear portions connected at their adjacent ends, second laterally spaced and vertically extending frame members rigidly secured to the rear ends of the rear portions of said first frame members and extending upwardly from said shaft, third laterally spaced upper frame members extending horizontally from said head to the upper ends of said second frame members and comprising flat and laterally spaced metal springs imparting vertical resilience and lateral stability to the frame, an engine supporting frame including fourth laterally spaced members pivotally connected at their rear ends with said shaft and supported at their front ends from the mid-portions of said third frame members, and a tank supporting bracket carried by said engine supporting frame.

10. A main frame for a vehicle of the class described, including a head, a wheel shaft, first laterally spaced lower frame members rigidly secured to said head and extending therefrom to said shaft, said first frame members each including front and rear portions connected at their adjacent ends, second laterally spaced and vertically extending frame members rigidly secured to the rear ends of the rear portions of said first frame members and extending upwardly from said shaft, third laterally spaced upper frame members extending horizontally from said head to the upper ends of said second frame members and comprising flat and laterally spaced metal springs imparting vertical resilience and lateral stability to the frame, pivotal connections between the ends of said third frame members and said head and said second frame members respectively, the front and rear portions of said first frame members being pivotally connected with each other on horizontal axes, a tubular member secured to and extending downwardly from the mid-portions of said third frame members, a rod extending upwardly from the pivotal connections of said first frame member portions and telescoping with a sliding fit in said tubular member, an engine supporting frame pivotally connected at its rear end with said shaft, and a link pivotally connecting said tubular member with the front portion of said engine supporting frame and thereby supporting the latter from said third frame members.

TRENOR P. JUDD.

CERTIFICATE OF CORRECTION.

Patent No. 2,187,238.

January 16, 1940.

TRENOR P. JUDD.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 4, second column, line 25, claim 4, for the word "resistance" read --resilience--; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 27th day of August, A. D. 1940.

Henry Van Arsdale,
Acting Commissioner of Patents.

(Seal)