

May 19, 1942.

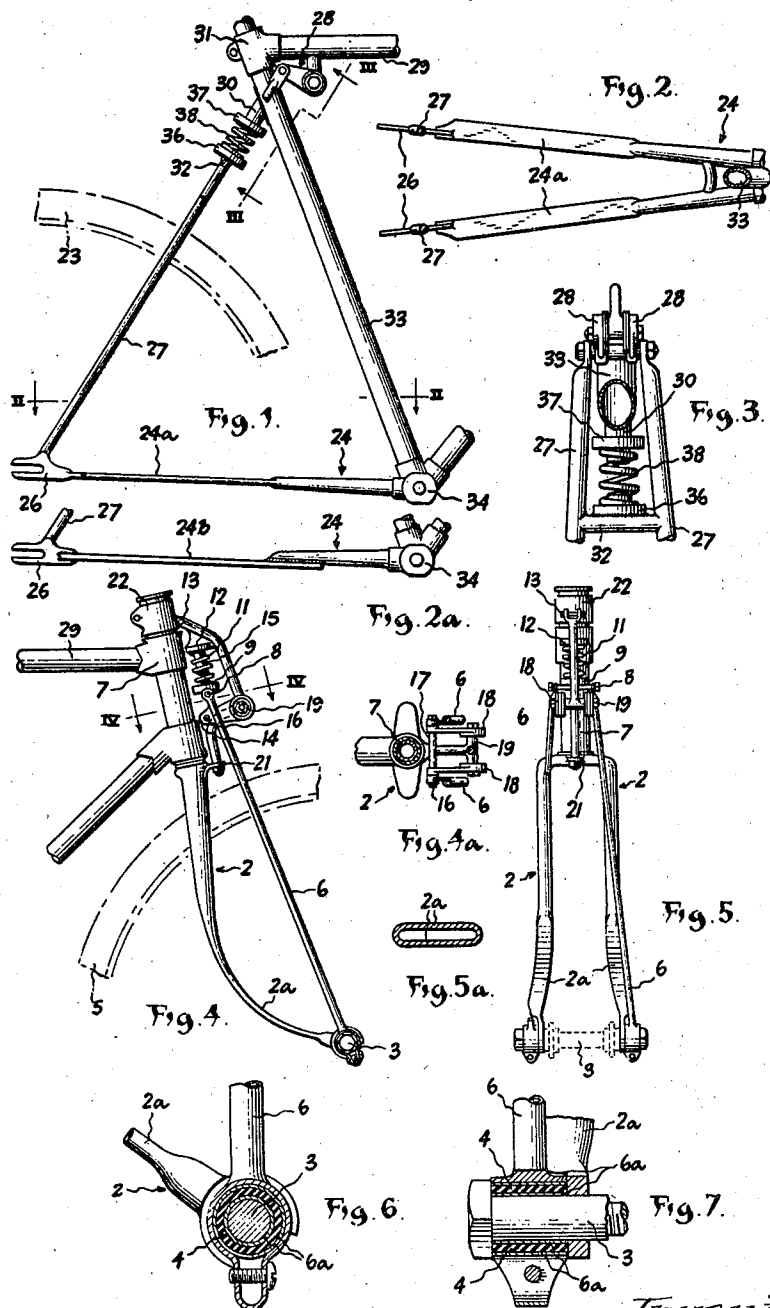
A. D. FINLAY ET AL

2,283,671

SPRING SUSPENSION DEVICE FOR CYCLES AND MOTORCYCLES

Filed Feb. 13, 1940

2 Sheets-Sheet 1



Inventors
Albert D. Finlay
Robert S. Finlay
By *J. J. Finlay* Atty.

May 19, 1942.

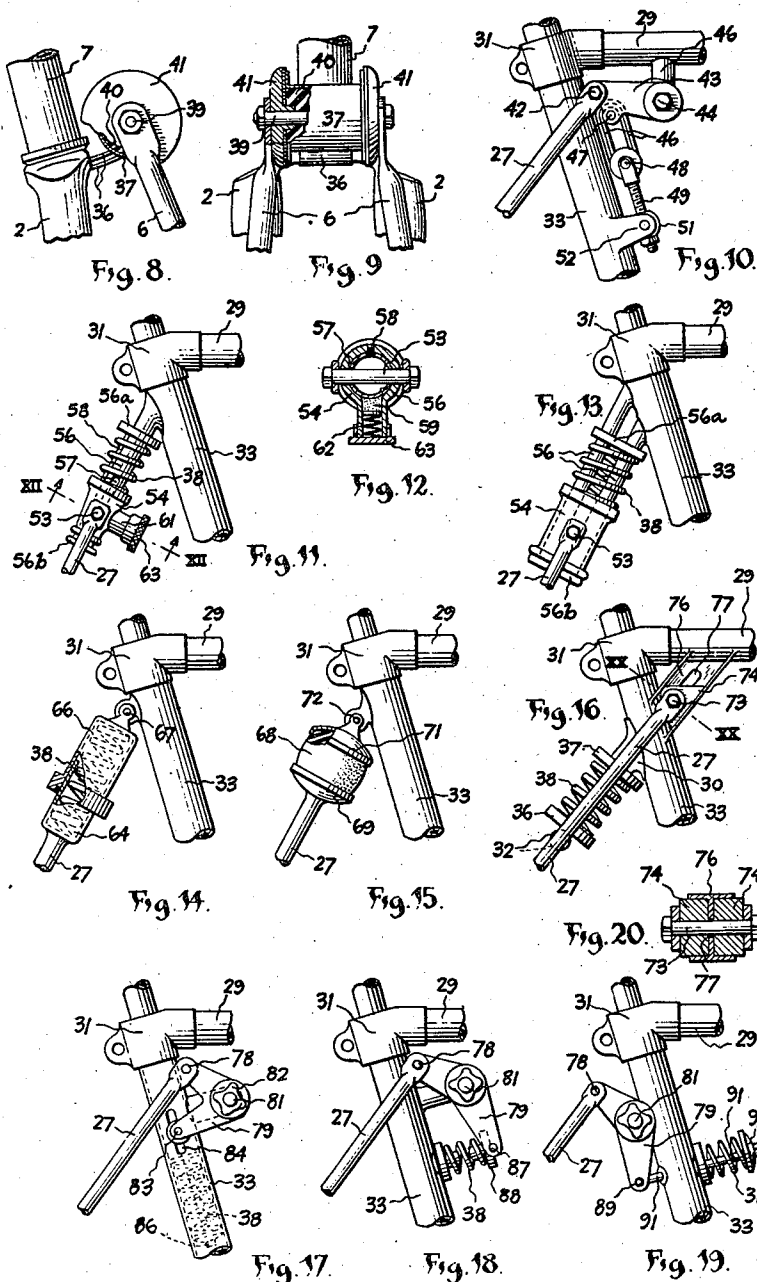
A. D. FINLAY ET AL

2,283,671

SPRING SUSPENSION DEVICE FOR CYCLES AND MOTORCYCLES

Filed Feb. 13, 1940

2 Sheets-Sheet 2



Inventors
 Albert D. Finlay
 Robert S. Finlay
 by J. J. Finlay Atty.

UNITED STATES PATENT OFFICE

2,283,671

SPRING SUSPENSION DEVICE FOR CYCLES
AND MOTORCYCLESAlbert Daley Finlay and Robert Studdy Finlay,
Melbourne, Victoria, AustraliaApplication February 13, 1940, Serial No. 318,756
In Australia March 16, 1939

3 Claims. (Cl. 280-284)

This invention relates to spring suspension devices for cycles and motor cycles and its object is to provide an improved construction of this type which is light, strong and effective and is applicable to both the front and rear wheels of the machine.

Referring to the drawings which form part of this specification:

Figure 1 is a side elevation of the rear portion of a cycle frame showing the invention applied thereto, portions being broken away for convenience of illustration.

Figure 2 is a sectional plan on the line II—II of Figure 1.

Figure 2a is a side view showing a modified construction of the rear spring fork.

Figure 3 is an enlarged section on the line III—III of Figure 1 looking in the direction of the arrows.

Figure 4 is a side elevation of the front portion of a cycle frame showing the invention applied thereto.

Figure 4a is a sectional plan on the line IV—IV of Figure 4.

Figure 5 is a front view of Figure 4, parts being broken away.

Figure 5a is an enlarged cross section of the flattened metal tubing forming the spring portion of the front fork members.

Figure 6 is an enlarged detail view showing in part sectional side elevation the resilient mounting of the front axle of the cycle in the lower end of an outrigger hereinafter described.

Figure 7 is a part sectional front view of Figure 6 showing the abovementioned resilient mounting of one end of the front axle in one of the outrigger legs.

Figure 8 is an enlarged fragmentary view in side elevation of a modified form of resilient connection between the upper end of the front fork and the upper end of the aforesaid outrigger which is located in front of said fork, parts being broken away for convenience of illustration.

Figure 9 is a part sectional front view of Figure 8.

Figure 10 is a fragmentary side elevation of a modified type of resilient connection between the upper ends of the rear diagonal stays and the rear part of the cycle frame adjacent the saddle pillar.

Figure 11 is a similar view of a further modified type of resilient connection between the upper ends of the rear diagonal stays and the adjacent part of the cycle frame.

Figure 12 is a cross sectional view on the line XIII—XIII of Figure 11.

Figures 13 to 19 inclusive are side views of further modified forms of the said resilient connection between the upper ends of the rear diagonal stays and the adjacent part of the cycle frame.

Figure 20 is an enlarged cross section on the line XX—XX of Figure 16.

According to the invention, the front fork 2 of the machine or portion thereof is constructed of spring material which may consist of flattened metal tubing or, if desired, of plate spring material, the tubular members of the fork 2 on either side of the wheel being preferably tapered or of gradually decreasing thickness and curved downwardly and forwardly towards their lower ends as indicated at 2^a in Figures 4 to 7 inclusive.

The lower ends of the said front spring fork members are adapted to receive the front wheel axle 3 and around this axle, at either side of the wheel 5, is a resilient sleeve 4 of rubber or the like which is interposed between inner and outer metal sleeves 6a.

Clamped around the said sleeves at either side of the front wheel are the lower ends of the two legs 6 of an outrigger which may be composed of light and strong metal bars and is adapted to prevent sideward movements of the wheel and control or stabilise the action of the spring fork. The sleeves 4 form resilient bearings between the lower ends of the outrigger legs 6 and the front axle 3.

The legs of the outrigger 6 extend upwardly above the front wheel and their upper ends, which are disposed in front of the steering neck 7 of the cycle frame, are provided with holes to receive a pivot pin 8 to which is connected a disc or the like 9 which engages the lower end of a coiled spring 11. The upper end of this spring engages a similar disc or the like 12 on a yoke 13 hereinafter described. A rubber buffer 15 may extend from the disc 12 through the spring 11 to retain the latter in position and absorb any rebound.

Also formed on the legs of the outrigger 6 near the upper ends thereof are lugs 14 (Figs. 4 and 4a) to accommodate a rear pivot pin 16 which passes through a transverse sleeve 17 (Fig. 4a) on the rear end of a shackle link 18. This link may comprise a pair of laterally spaced arms (Fig. 5) the forward ends of which carry a front pivot pin 19 which is disposed in front of the outrigger 6.

Pivoted to the said front pivot pin 19 is the intermediate portion of the aforesaid yoke 13, the lower portion of which extends downwardly and rearwardly as in Figure 4 and the lower end of which is attached to a lug 21 on the upper end of the front spring fork 2 with which the yoke and the outrigger may swivel bodily in accordance with the steering movements of the front wheel 5.

The upper end of the yoke 13 is pivoted to the swivelling steering column 22 above the steering neck 7 of the main frame and the aforesaid coiled spring 11 is disposed between the yoke 13 and the steering neck 7 and presses at its upper and lower ends against the aforesaid discs or the like 9 and 12 on the yoke 13 and on the upper end of the outrigger 6 respectively.

The rear wheel 23 of the machine is preferably mounted between the laterally spaced members of a substantially horizontal rear spring fork 24 (Figs. 1 and 2) which may also be constructed of metal tubing flattened as at 24^a to form spring forks extending rearwardly to the bearing members or brackets 26 which accommodate the axle of the rear wheel 23.

Instead of forming the rear spring forks of flattened metal tubing as aforesaid, plate spring strips 24^b may be secured by brazing or other means to the bearing members 26 and the front portions of the rear fork 24 as in Figure 2a.

Extending upwardly and forwardly from the bearing members 26 on the rear spring fork 24 are diagonal rear stays 27, the upper ends of which are pivoted to the rear end of a rear shackle link 28, which may also comprise a pair of laterally spaced arms similar to the front shackle link 18 previously referred to. This rear link 28 is pivoted at its forward end to a suitable adjacent part of the cycle frame, such, for instance, as the top horizontal member 29 of the main frame which extends forwardly from the saddle bracket 31 to the steering neck 7 within which turns the steering column 22.

A cross piece 32 is provided on the upper portion of the said diagonal rear stays 27 and attached to this cross piece and to a lug 30 on the rear member 33 of the main frame which extends downwardly and forwardly from the saddle bracket 31 to the pedal shaft bracket 34, are discs or the like 36 and 37 between which a coiled spring 38 is arranged and adapted to absorb shocks transmitted from the rear wheel through the diagonal rear stays 27.

By means of the foregoing construction a light, strong and efficient means of suspension of the cycle or motor cycle frame on the front and rear wheels is provided, so that road shocks and vibrations are reduced to a minimum and riding comfort is greatly enhanced.

According to a modification, the resilient connection between the upper ends of the outrigger legs 6 and the upper end of the front fork 2 may be constructed as illustrated in Figures 8 and 9. In this modification the upper end of the front spring fork 2 is provided immediately beneath the steering neck 7 with a forwardly extending lug 35 carrying a transversely disposed tubular sleeve 37. Accommodated by this sleeve is a cylindrical rubber buffer 40 through which passes a transverse pin or bolt 39 which is attached to the upper ends of the outrigger legs 6. Side cheeks 41 are fitted around the pin 39 between the ends of the rubber buffer 40 and the flattened upper ends of the outrigger legs 6 as seen in Figure 9.

The resilient connection between the upper

ends of the rear diagonal stays 27 and the adjacent part of the cycle frame as illustrated in Figures 1 and 3 may also be modified in various ways as illustrated in Figures 10 to 20 inclusive.

According to the modification illustrated in Figure 10 the upper ends of the diagonal rear stays 27 may be pivoted as at 42 to the rear end of a link 43, the front end of which is pivoted as at 44 to a downward extension 46 of the aforesaid horizontal member 29 of the cycle frame. In this embodiment endless elastic straps 46 may pass around a transverse pin or roller 47 on the link 43 and around a co-operating pin or roller 48 on an adjusting screw or bolt 49 which passes through an internally threaded block 51 on a lug 52 carried by the aforesaid member 33 of the cycle frame.

According to the modification illustrated in Figures 11 and 12, the upper ends of the diagonal rear stays 27 are connected to a transverse pivot pin 53 attached to a socket 54 which slidably accommodates a diagonally disposed stem 56 extending downwardly and rearwardly from the frame member 33. The pivot pin 53 passes through elongated slots 57 in the stem 56 which is prevented from turning within the socket 54 by means of a key or feather 58. Sliding movement of the socket 54 in relation to the stem 56 may be suitably checked by means of a fibre or like pad or damper 59 (Figure 12) which may be accommodated in a branch 61 of the sleeve 54 and is pressed against the stem 56 by a spring 62, the pressure of which may be adjusted by a screw threaded cap 63. Interposed between the sleeve 54 and a shoulder 56a on the stem 56 is the coiled spring 38 which corresponds to the spring shown in Figures 1 and 3. A stop 56b is provided on the lower end of the stem 56 to limit its sliding movement within the sleeve 54.

A similar modified arrangement is shown in Figure 13 where the sleeve 54 slidably accommodates a pair of rearwardly and downwardly extending diagonal stems 56 on the frame member 33, the spring 38 encircling the stems 56 between the sleeve 54 and the shoulder 56a on said stems which are provided at their lower ends with the limit stops 56b.

According to the modification illustrated in Figure 14 the spring 38 is accommodated in a telescopic casing one section 64 of which is attached to the upper ends of the diagonal rear stays 27 while the other section 66 of the telescopic casing is pivoted as at 67 to a lug on the frame member 33.

In the modification illustrated in Figure 15 a rubber or like buffer or cushion 68 is accommodated between cupped members or discs 69, 71, the former of which is attached to the upper ends of the diagonal rear stays 27 whilst the latter is pivoted as at 72 to a lug on the frame member 33.

Figures 16 and 20 show a further modified arrangement according to which the upper ends of the rear stays 27 are pivoted to a transverse pin 73 passing through slide blocks 74 which are adapted to slide within guideways formed in a diagonal rib 76 extending between the frame members 29 and 33. This diagonal rib is provided with a slot 77 to slidably accommodate the pivot pin 73. In this case the spring 38 is accommodated between discs or the like 36 and 37 which are carried respectively by the aforesaid cross piece 32 on the diagonal rear stays 27 and by the lug 30 on the frame member 33.

in a similar manner to that described with reference to Figure 1.

According to the modification illustrated in Figure 17 the upper ends of the diagonal rear stays 27 are pivoted as at 78 to one arm of a bell crank lever or link 79 which is intermediately pivoted as at 81 to a lug on the frame member 33, spring check nuts 82 being preferably fitted on the ends of the pivot pin 81. The other arm of the bell crank lever or link 79 is connected to a pivot pin 83 which passes through elongated slots 84 in the tubular frame member 33 and is connected to a rod 86 which is slidably accommodated within the frame member 33. This rod is encircled by the spring 38 which in this case is also accommodated in the tubular frame member 33 and is compressed by the sliding movement of the rod 86 in accordance with the movements of the stays 27 and the bell crank lever 79.

A somewhat similar arrangement is shown in Figure 18 where the bell crank lever or link 79 is attached to a disc or the like 88 between which, and the frame member 33, the spring 38 is suitably retained.

According to the further modification illustrated in Figure 19, the bell crank lever or link 79, which is pivotally mounted on the frame member 33 and pivotally connected at one end to the upper ends of the diagonal rear stays 27 as aforesaid, is pivoted at its opposite end as indicated at 89 to a rod 91 which passes slidably through the frame member 33 and is encircled by the spring 38 which is compressed between the frame member 33 and a disc or the like 92 and the rod 91.

It will be evident that the modified construction illustrated in Figures 8 and 9 may be substituted for the resilient connection between the upper end of the outrigger 6 and the upper end

of the front fork 2 whilst either of the modifications illustrated in Figures 10 to 20 inclusive may be substituted for the resilient connection between the upper ends of the diagonal rear stays 27 and the adjacent part of the cycle frame as described with reference to Figures 1 and 3.

We claim:

1. A spring suspension for cycles, including a main frame including an upright member, a pair of fork members connected to said upright member and extending rearwardly therefrom to accommodate a wheel between them, each fork member being of tubular stock, flattened and diametrically increased for a portion of its length to provide a section of relatively increased resiliency, the ends of the resilient sections being terminally formed to support a wheel axle, a stay extending upwardly and forwardly from the axle-receiving end of each fork member, the upper ends of the stays extending forwardly of and on opposite sides of the upright member of the main frame, and a shackle supported by a member of the main frame and to which the upper ends of the stays are connected forward of the upright member of the main frame.

2. A construction as defined in claim 1 wherein a spring cushion is interposed between the stays and the upright member of the main frame rearwardly of said upright member.

3. A construction as defined in claim 1, wherein the stays are provided rearwardly of the upright member of the main frame with a rigid connecting element, and wherein the upright member of the main frame is also provided with a similar element, with said elements in line in the plane of the stays, together with a spring between and bearing against said elements.

ALBERT DALEY FINLAY.

ROBERT STUDDY FINLAY.