UNITED STATES PATENT OFFICE

STAND FOR BICYCLES

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The present invention relates to stands for bicycles, and is particularly concerned with stands of the type usually termed "kick-stands," due to the fact that it may be moved into or out of its operative position by a kick of the user.

In the kick-stands of the prior art, with which I am familiar, the working parts are generally exposed to the elements with resultant rapid wear and a vast number of users.

Due to this fact and the fact that they cannot be lubricated without gathering dust and dirt, this accumulation of dust and dirt accelerates the wear because the combination of the dust and dirt with the oil acts as an abrasive.

When such a device of the prior art has been lubricated, the dust and dirt on the lubricated parts presents a situation in which the mechanism looks very unsightly and there is always the possibility of the dust, dirt and oil getting on the clothing of the user, and as a result the users dispense with lubrication. This also results in rapid wear and increases the friction involved in the movement of the stand from one position to another, so that the rider may resort to drastic action, such as violent kicking in the use of the device, which also serves to shorten its useful life.

One of the objects of the invention is the provision of an improved kick-stand for bicycles in which the mechanism is suitably enclosed so that it is protected from exposure to the elements and so that it may be suitably lubricated without gathering dust and dirt on the exterior of the assembly.

Another object of the invention is the provision of a kick-stand which is adapted to be maintained in a well lubricated condition without having the lubricant leak out and cover the exterior of the housing so as to eliminate any possibility of dust and dirt getting into the mechanism, or of having the exterior parts of the mechanism covered with lubricant which would gather dust or dirt.

Another object of the invention is the provision of a device of the class described which is simple, sturdy and capable of being manufactured at a low cost, so that it may be placed within the means of a vast number of users.

Another object of the invention is the provision of an improved construction for kick-stands which can be manufactured for sale as a separate accessory, or which may be incorporated as a permanent part of the bicycle.

Another object of the invention is the provision of an improved kick-stand which is adapted to be held firmly in its operative position and which may be moved from either one or the other of its positions with a minimum amount of effort.

Other objects and advantages of the invention will be apparent from the following description and the accompanying drawings in which similar characters of reference indicate similar parts throughout the several views.

Referring to the drawings, of which there are four sheets:}

Fig. 1 is a fragmentary sectional view taken on a vertical plane passing through the lower part of a bicycle frame, showing a kick-stand attached to the frame embodying the present invention, supporting the bicycle in an approximately vertical position;

Fig. 2 is a fragmentary top plan view with the kick-stand shown in full lines in its folded or inoperative position, and shown in dotted lines in its extended or operative position;

Fig. 3 is a fragmentary front elevational view of the same kick-stand shown in Fig. 2;

Fig. 4 is a fragmentary sectional view taken on the plane of line 4—4 of Fig. 2 looking in the direction of the arrows;

Fig. 5 is a fragmentary elevational view taken on the plane of the line 5—5 of Fig. 4, looking in the direction of the arrows;

Fig. 6 is a fragmentary sectional view taken on the plane of the line 6—6 of Fig. 4, looking in the direction of the arrows;

Fig. 7 is a fragmentary sectional view taken on the plane of the line 7—7 of Fig. 4, looking in the direction of the arrows;

Fig. 8 is a view similar to Fig. 2, showing a modified form of construction;

Fig. 9 is a fragmentary sectional view taken on the plane of the line 9—9 of Fig. 8, looking in the direction of the arrows, and showing this modified construction;

Fig. 10 is a fragmentary top plan view of the housing showing the cap which closes the end of the housing in section;

Fig. 11 is a side elevational view of the housing for this construction;

Fig. 12 is a side elevational view of the cam of Fig. 10;

Fig. 13 is a top plan view of the housing of Fig. 11;

Fig. 14 is a top plan view of the cam of Fig. 12;

Fig. 15 is a view similar to Fig. 2, showing a second modified form of construction of the kick-stand;

Fig. 16 is a fragmentary sectional view taken on the plane of the line 16—16 of Fig. 15, looking in the direction of the arrows;
Fig. 17 is a fragmentary sectional view taken on the plane of the line 17—17 of Fig. 16, looking in the direction of the arrows;

Fig. 18 is a fragmentary end elevational view of the mechanism of Fig. 16 taken on the plane of the line 18—18 of that figure, looking in the direction of the arrows;

Fig. 19 is an elevational view of the housing for the mechanism of Fig. 16;

Fig. 20 is a top plan view of the cam of the mechanism of Fig. 16;

Fig. 21 is a side elevational view of the same cam;

Fig. 22 is a view similar to Fig. 2 of a third modified form of construction showing how the kick-stands may be constructed as separate accessories to be attached to the conventional bicycle;

Fig. 23 is a fragmentary sectional view taken on the plane of the line 23—23 of Fig. 22; looking in the direction of the arrows;

Fig. 24 is a fragmentary sectional view taken on the plane of the line 24—24 of Fig. 22, looking in the direction of the arrows.

Referring to Figs. 1 to 7, 30 indicates in its entirety a bicycle frame, the front of which is shown in order to illustrate the application of the invention to a bicycle.

The frame portion shown includes the crank arm bearing hanger 31, which is integrally attached to the lower rear fork members 32, 33 and to the upwardly extending frame member 34 which usually ends in a saddle post and the forward extending frame member 35.

The kick-stand is indicated in its entirety by the numeral 38 and it preferably includes a housing member 37 and the usual prop or sprag 38 which is movably supported by the housing 37 for movement into the inoperative or folded position, which is shown in full lines in Fig. 2, or into the operative or extended position, which is shown in dot-dash lines in that figure.

The housing 37 comprises a tubular metal member which is preferably substantially cylindrical and preferably constructed of steel, having a cylindrical wall portion 39 and a plane end wall 40.

The kick-stand is preferably secured to the frame by having its housing 37 brazed or welded to the lower sides of the two lower fork members 32, 33, the brazing being indicated at 41, Fig. 2.

The housing 37 extends transversely to the lower rear fork members 32, 33, and at such an angle to these fork members that the sprag 38 when it is in the folded position is preferably located immediately adjacent to or substantially under the nearest fork member 33. This angular position is caused by the fact that it is desirable to have the lower end portion 42 of the sprag 38 disposed laterally with respect to the bicycle frame when the sprag extends downward so that it may better act as a prop, and by reason of the fact that it is desirable to have the sprag folded compactly with respect to the frame 33 when it is in the folded position.

The direction of the present kick-stand is manufactured and permanently attached to the frame by brazing or welding or by having the frame provided with an integral housing portion 37, I prefer to dispense with the usual short horizontal member which would otherwise extend from the fork member 32 to the frame member 33 immediately to the right of the present location of the housing 37.

The sprag 38 preferably consists of a rod of steel or the like which is preferably cylindrical in shape so that portions of it may serve as a journal without the necessity for further machining. It comprises the lower end portion 42, the column portion 43 and the upper bearing portion 44. The lower end portion 42 is formed by bending the rod at the point 45 at an angle which is preferably slightly less than 90 degrees, so that the lower end portion 42 may be used as a fork for supporting the column 43 of the sprag.

The upper bearing portion 44 also extends at an angle to the body 43, being bent at the point 46 at an angle that is preferably slightly more than 90 degrees.

The assembly preferably includes a cam member 47 which consists of a substantially cylindrical metal member shaped to fit into a cylindrical bore of the housing 37. Here it is secured by means of a tapered pin 48 which passes in at an aperture 49 in the lower side of the housing Fig. 6, and cut of an aperture 50 of the top side of the housing 37, these apertures being in alignment and preferably being formed with a taper corresponding with the pin 48.

The bore which forms the apertures 49, 50 is located eccentrically with respect to the tube 37, so that the pin 48 is located just inside the wall 39 in position to engage in a groove 50 in the side of the cam member 47. Thus the pin 48 is adapted to fasten the cam 47 in the housing 37 and to secure the cam against rotation as well as provide longitudinal movement.

The outer end of the cam 47 may have an annular plane surface 51 and the outer corners at 52 may be rounded. The cam 47 is provided with a through bore 53 axially located in the cam 47 and adapted to serve as a bearing for the upper end portion 44 of the sprag.

The right or inner end of the cam 47 is formed with a pair of partially spherical grooves 54, Fig. 5, and 55, Fig. 4. Each of these grooves is formed with one abrupt side wall, such as the side wall 56 of the groove 54, and the side wall 56 of the groove 55. These side walls serve as stops for determining the final position of a transverse pin 58 carried by the trunnion 44 of the sprag 38.

The pin 58 is preferably of steel and since it is confined in a diametrically located bore 59 in the end portion 44 of the sprag, and also confined in the housing 37, it need only have a sliding fit in its bore 59, but if desired it may have a slight frictional fit.

The right end of the cam 47 is divided by the grooves 54 and 55 into four quarter portions, two of which project farther in an axial direction terminating in the plane surface 60.

The depth of the grooves 54, 55 in an axial direction with respect to the end surfaces 60 and 61 is preferably slightly less than the diameter of the pin 58, so that the thrust washer 62 will have its end surface 63 in snug contact with the adjacent side of the pin 58 to hold it in its groove, rather than engaging the end portions 60, 61 of the cam 47.

Other diametrically opposed surface, 54, 55 of the cam 47 are located inwardly closer to the bottom, that is, the left side of grooves 54, 55 so that there will be an open space or slot between the washer 63 and the annular end surfaces 64, 65 on the cam. In other words, the grooves 54 and 55 have a side wall which is less of an obstruction to the lateral movement of the
pin 58 on the sides of the grooves which border the slot 56.

The surface 67 in each groove is adapted to act as a wearing surface to cam the pin 58 in an axial direction when the spring is rotated, for example, in the clockwise direction in Fig. 4 while the opposite side of each groove acts as a stop for finally determining a rotative position of the sprag.

The washer 63 is preferably rectangular in cross section and provided with an outer cylindrical surface 68 having a sliding fit in the bore of housing 37.

The compression spring 69 comprises a helical member, the cross section of which corresponds substantially to a parallelogram, as this spring is provided with a cylindrical bore 70 having a rotating fit on the end portion 44 of the sprag and serving as a bearing.

The washer 53 also preferably has a cylindrical bore 11 for the same purpose. Both ends of the helical spring 69 preferably have tapered portions 12, so that each end 72 of the spring presents an annular plane surface. One of the ends of the sprag engages the end wall 49 of the housing, and the other end of the sprag engages the washer 63, the spring being provided with an initial compression.

The length of the trunnion 44 of the sprag 38 is such that when the pin 58 is in one of the notches or grooves 54, 55, there is a clearance between the end 75 and the end 44 of the housing 37, sufficient to permit the pin 58 to cam out of its groove and ride on the surface 55.

The operation of this embodiment of the invention is as follows:

When the sprag is in the folded position, as shown in Fig. 3, its pin 56 is located in groove 55 where it is retained by the axial thrust that is placed upon the pin 58, washer 53 and trunnion 44 by the spring 69. The cam 41 is of course fixedly secured in the housing and the housing is fixedly secured to the frame and the sprag is then located substantially near in the rear fork members 33 in such a position that it cannot engage the wheel nor is it in position to interfere with the crank pedals or the feet of the operator. The foot portion 42 preferably projects slightly beyond the lower fork member 33, so that the operator can engage it with his foot if he wishes to turn the sprag downward.

When the sprag is to be used, it may be turned downward by the rider by using his foot on the end 42 to exert a rotative force on the trunnion portion 44 of the sprag. This will cause the pin 56 to cam against the adjacent surfaces 37 on the lower side wall of groove 55 and the trunnion portion 44 will be cammed toward the right as in Fig. 4, so that the pin 58 will rise out of its groove compressing the spring 69. The sprag may then be rotated on trunnion 44, the pin 58 sliding on the surfaces 69 and 64 until it registers with the groove 54 when the sprag will be in the dotted line position of Fig. 2.

The pin 58 will then be forced into the groove 64, the trunnion portion 44 moving axially and the sprag will be held in its position by the spring 69, which is the position shown in full lines in Fig. 1, where the stand is used for holding the bicycle in nearly erect position.

The trunnion portion 44 of the sprag is journaled not only in the bore 53, but cam 67 of washer 63 and spring 69 also act as bearings, so that it has a long bearing surface. The housing portion which contains spring 69 may be packed with grease, leaving only sufficient air space so that the trunnion can move inward as described and every time that the sprag is turned in its housing there will be a tendency for the grease to be distributed and agitated to cause better lubrication.

When the kick-stand is to be folded, the operator may also use his foot for pushing it back to the position of Fig. 2. The dotted line position of Fig. 1 is that which the stand assumes when the bicycle is supported by it. The column 43 of the sprag is short enough to cause the frame to tilt so that part of its weight is borne by the sprag.

Referring to Figs. 8 to 14, these figures show the construction of a modified form of kick-stand, the housing of which may be attached to the frame in the manner previously described, and the construction of the spars may also be substantially as previously described, except for the location of the pin 58.

In this case the collar member 76 is similar to the cam 41, except that it serves only as a bearing member and it may be spot-welded or otherwise secured to the trunnion portion 77 of this sprag on the points 78.

The end wall 79 of the housing 80 has a bore 81 for passing the trunnion portion 77 of the sprag, and the helical spring 82 acts against the end wall 79 and urges the collar 76 outward. The collar 79 rotates and slides in the housing 80.

The cam 83 comprises a hardened metal member which may be of substantially cylindrical shape, except for its end portions. At its left end portion the cam 83, Fig. 14, has an axially projecting cylindrical wall portion 84 that is adapted to fit into a complementary slot or recess 85 which is formed in the end of the cylindrical wall or housing 80. Two such portions 84 are provided on the cam 83 at diametrically opposite points for engaging the diometrical recesses 85 shown in the housing 80, Fig. 11. Thus the cam 83 may be mounted on the housing 80 and relative rotation prevented by the lug 84 in recess 85.

Cam 83 has a through bore 86 for passing the sprag trunnion 77; upon its outer face it has the grooves 54, 55 and other surface formations exactly as described with respect to Figs. 4 and 5 after receiving and engaging the pin 87.

Pin 87 is located in a transverse cylindrical bore 88 in the sprag trunnion immediately adjacent the end of the trunnion and the spring 82 has an initial compression for urging the pin 87 into the grooves 54, 55.

In this case the working parts at the right end are preferably enclosed by a sheet metal cap 89 comprising a sheet metal member having a cylindrical wall 90 and plane end wall 91, and having inwardly pressed tongues 92 engaging in the groove 93 between the cam 83 and housing 80. This embodiment works substantially the same as the preceding one and its parts may likewise be packed with grease.

The complete assembly including housing 80 and cap 89 is again welded to the bicycle frame as previously described.

In this case, however, the collar 76 rotates and slides with the sprag trunnion 77.

Referring to Figs. 15 to 21, these show another modified form of construction in which the cam is located at the closed end of the housing and the collar previously described is removably secured to the housing. In this case the collar 95...
is provided with an annular groove 98, preferably of partially circular cross section and the groove is adapted to receive the legs 97 of a spring-retaining wire 98 of substantial U shape.

The housing 99 has a pair of vertically extending bores 100, one at each side and each bore is located just inside of the wall of the housing, so that it may receive the legs 97 of wire 98 when they are located in the groove 96 of the collar 95.

Wire 98 may have a frictional fit in its bores or it may be so tensioned that it is held in place.

The end wall 101 of housing 99 is provided with a pair of radially extending slots 102 which may communicate with a through bore 103. The slots 102 are adapted to receive the axially extending lugs 104 which act as a key engaging in the recesses 102 to prevent rotation of the cam 105 with respect to the housing 99.

Cam 105 of this type has its grooves 54, 55 formed in the left side of the cam, Fig. 20, Fig. 21, and the cam is provided with a through bore 105.

In all other respects the left side of this cam is substantially the same as the right side of the other with respect to Figs. 3 and 4. In this case the pin 107 is disposed in a bore 108 of the trunnion portion 109 of the sprag, which bore is located inwardly in the end 110 of the trunnion, so that the trunnion closes the hole 103 in the end wall. In other embodiments of the invention the trunnion may be shorter and the end wall closed when there is sufficient clearance between the end of the trunnion and the end wall.

This modification works substantially the same as the others, but it differs from those previously described in that the trunnion 105 moves axially toward the left when the pin 107 is forced out of its grooves during the rotation of the sprag.

Referring to Figs. 22 to 24: These are views which show how the present kick-stand may be embodied in a construction that can be attached to any bicycle of conventional construction instead of being permanently brazed or welded to the frame. This mode of attachment is applicable to all of the kick-stands previously described and the housing 31 and sprag 38 are exemplary of any of these types.

The housing 31 has welded to it a bracket 111 which is similar to oppositely disposed loose bracket 112. Each of these brackets has a central web portion 113, the web portion being tapered as shown in Fig. 22, so that it is adapted to support the partially cylindrical portions 114, 115 in the proper position to engage the inner and upper cylindrical wall portion of the lower rear fork members 32, 33, which usually spread rearwardly from the hanger 31. In the same way the lower bracket 111 engages the inner and lower surfaces of these fork members and there is preferably a space 116 between the two webs 113, so that these brackets can be clamped against the fork members without the webs interfering with each other.

The webs 113 of brackets 111, 112 are each provided with a pair of registering bores 117 for receiving the screw bolts 118. An elongated nut plate 119 may be located between the web 113 and the housing 37, this plate being provided with two threaded bores 120 which are located to receive the threaded ends 121 of the screw bolts 118 when the bolts are located in the brackets. Nut plate 119 is preferably spot-welded to bracket 111. The screw bolts 118 are preferably of the type having an elongated head 122, the non-circular portion of which projects sufficiently above the bracket 112 so that access may be had by means of an ordinary wrench.

It should be noted that the housing 31 is preferably disposed at such an angle to the brackets 111, 112 that the sprag 38 is properly disposed adjacent the rear fork member 32 when the sprag is in folded position, but in some embodiments of the invention may have their webs 113 substantially rectangular so that a certain amount of angular adjustment may be secured by turning the brackets with respect to the fork members 32, 33, but they are clamped in position by means of bolts 118.

It will thus be observed that I have invented improved forms of kick-stands in which all of the mechanism may be so enclosed that it may be packed with grease for continuous lubrication to reduce the weight and keep the parts in proper operating condition. Lubricated parts are all enclosed so that they do not accumulate dust and dirt.

The present kick-stands are similar in construction adopted to be manufactured with a minimum of material and labor and they are sturdy and capable of being used for a long period of time without the necessity for repair. They are so attached to the bicycle frame that they support the bicycle adequately, yet when they are folded there is no possibility of their getting out of alignment so as to interfere with the movement of the mechanism of the bicycle or with the feet of the operator.

The sprag trunnion has a long bearing surface within the cam spring and housing and since the device is dust-proof it can be packed with grease so that it need not be lubricated for a very long time. All of the working parts are so enclosed that there is very little possibility of dust and grime getting into cause any wear, so that the present devices are adequately protected from the elements and they may be used indefinitely without need for replacement of any parts.

While the kick-stands are preferably permanently attached to the bicycle frame, they may also be provided with suitable brackets so that they can be sold as a separate accessory to be secured to any conventional bicycle.

While I have illustrated a preferred embodiment of my invention, many modifications may be made without departing from the spirit of the invention, and I do not intend to be limited to the precise details of construction set forth, but desire to avail myself of all changes within the scope of the appended claims.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent of the United States is:

1. A kick-stand for bicycles, comprising a tubular metal housing fixedly secured to the lower side of the rearwardly extending lower rear fork members, a prop having a laterally turned portion at its upper end adapted to serve as a trunnion rotatably mounted in said tubular member, a bearing carried by said tubular member at the end where the trunnion emerges from said tubular member, a transverse metal pin carried by said trunnion, a helical spring having a partially cylindrical inner bore engaging said trunnion and serving as a bearing, said spring having an external partially cylindrical surface engaging the inside of said tube, a cam member having a bore for said trunnion and having on its end a pair of grooves for receiving said pin to hold the pin in two positions, one position being elevated for non-use and the other
position being depending to serve as a prop for a bicycle, said spring engaging said pin and urging said pin into engagement with the grooves of said cam, said tubular housing being substantially enclosed about said trunnion, pin, bearing, cam, and spring to retain lubricant and exclude dirt.

2. A kick stand unit for bicycles comprising a substantially cylindrical housing member having one closed end and the other open and having a cylindrical bore, the said cylindrical bore being of uniform diameter throughout, and a combined cam and bearing member located in the open end of said bore, said latter member comprising a cylindrical metal member provided with a centrally located cylindrical bore and with an inner cam shaped end having a pair of diametrically extending partially cylindrical grooves located at substantially ninety degrees from each other, the said grooves being joined on one side by a camming surface of reduced axial length and on the other side having an axially extending shoulder, a bicycle stand prop comprising an elongated rod having a laterally bent trunnion portion of cylindrical shape, said trunnion portion being mounted in said bearing and extending into said housing but terminating short of the closed end thereof, said trunnion portion having a transversely extending through pin located in a transverse bore for reception in either of said diametrically extending grooves, and spring means located in said housing and urging said pin into said grooves, said spring means comprising a helically wound spring having an inner cylindrical surface engaging said trunnion, and an outer cylindrical surface engaging in said housing to provide bearing surface for said trunnion substantially throughout the length of said housing.

4. A kick stand unit for bicycles comprising a substantially cylindrical housing member having one closed end and the other open and having a cylindrical bore, the said cylindrical bore being of uniform diameter throughout, and a combined cam and bearing member located in the open end of said bore, said latter member comprising a cylindrical metal member provided with a centrally located cylindrical bore and with an inner cam shaped end having a pair of diametrically extending partially cylindrical grooves located at substantially ninety degrees from each other, the said grooves being joined on one side by a camming surface of reduced axial length and on the other side having an axially extending shoulder, a bicycle stand prop comprising an elongated rod having a laterally bent trunnion portion of cylindrical shape, said trunnion portion being mounted in said bearing and extending into said housing but terminating short of the closed end thereof, said trunnion portion having a transversely extending through pin located in a transverse bore for reception in either of said diametrically extending grooves, and spring means located in said housing and urging said pin into said grooves, said spring means comprising a helically wound spring having an inner cylindrical surface engaging said trunnion, and an outer cylindrical surface engaging in said housing to provide bearing surface for said trunnion substantially throughout the length of said housing, and a washer interposed between said spring means and said pin for equalizing the thrust on both ends of said pin.

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