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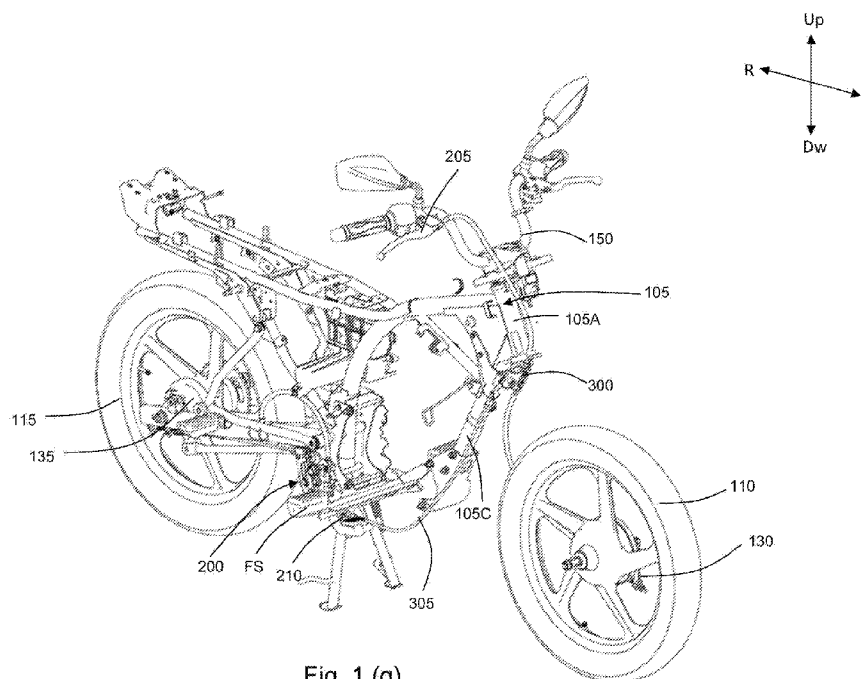


Fig. 1 (g)

(57) Abstract: The present subject matter discloses a vehicle (100) with a synchronous brake assembly (200). An intermediate actuating member (300) disposed in vicinity of a steering support structure (105A) and said intermediate actuating member (300) is secured to a frame member (105) of said vehicle (100). Further, said intermediate actuating member (300) is pivotable about rotational plane which is at first angle (Θ) with respect to the longitudinal plane of said vehicle (100) for enabling provision of optimal arm (300A, 300B) length thereby providing effective stroke and improved brake reliability. Further, rotational plane can be disposed at a second angle with respect to a horizontal plane thereby providing improved freedom of orientation and also enables compact packaging.

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SYNCHRONOUS BRAKE ACTUATION ASSEMBLY FOR A TWO-WHEELER

FIELD OF INVENTION

5 [0001] The present subject matter, in general relates to a braking system, and in particular relates to a brake actuation assembly for a vehicle.

BACKGROUND

10 [0002] In the last few decades, two-wheeler automobile industry has shown a remarkable growth and development, in terms of technology as well as sales. Due to consistent advancement in technology, two-wheeled vehicles, such as bicycles, motorcycles, scooters and lightweight scooters, have succeeded in maintaining their popularity among different sections of society. Different sections of society, based on their requirement, utilize the two-wheeled vehicles for various purposes, such as a recreational activity, a means of transportation, and for sports activities. As a result, it becomes pertinent for the two-wheeler automobile industry to
15 constantly develop and modify the components of the two-wheeled vehicles to suit requirements of different riders.

[0003] In accordance with the same ideology, various types of braking systems have been developed for facilitating braking functionalities in the two-wheeled vehicles. Conventionally, braking systems that allow simultaneous actuation of a
20 front brake and a rear brake upon application of a single brake lever have gained widespread popularity across the globe.

[0004] Generally, two-wheeled vehicles are provided with a pair of mechanically operated drum brakes. However, with the advent of braking technology, hydraulically operated drum brakes, disc brakes have, or a combination of both
25 have come to use. Also, in some applications disc brake is installed on both front and rear wheels. However, such a determination of whether to use two disc brakes or one is primarily based on the capacity of the vehicle and the maximum load capable of being carried by the vehicle. Generally, irrespective of the type of

brake used, the brake can be actuated mechanically or hydraulically or by a combination of both.

BRIEF DESCRIPTION OF THE DRAWINGS

- 5 **[0005]** The detailed description is described with reference to the accompanying figures. The same numbers are used throughout the drawings to reference like features and components.
- [0006]** Fig. 1 (a) depicts a right side view of an exemplary two-wheeled vehicle, in accordance with an embodiment of the present subject matter.
- 10 **[0007]** Fig. 1 (b) illustrates a frame member of the vehicle employed with selected parts, in accordance with the embodiment as depicted in Fig. 1 (a).
- [0008]** Fig. 1 (c) depicts an enlarged view of the frame member, in accordance with the embodiment of Fig. 1 (b).
- [0009]** Fig. 1 (d) depicts a perspective view of the intermediate actuating member, in accordance with the embodiment of Fig. 1 (b).
- 15 **[0010]** Fig. 1 (e) depicts the support bracket in accordance with the embodiment of Fig. 1 (b).
- [0011]** Fig. 1 (f) depicts an exploded view of the actuation assembly, in accordance with the embodiment of Fig. 1 (c).
- 20 **[0012]** Fig. 1 (g) depicts a front perspective view of the two-wheeler having a synchronous braking system and an actuating braking assembly, in accordance with the embodiment as depicted in Fig. 1 (b).

DETAILED DESCRIPTION

- 25 **[0001]** Conventionally, two-wheeled vehicles are provided with a braking system for slowing or stopping the vehicle. The braking system, usually, includes at least one brake, such as a front wheel brake assembly and a rear wheel brake assembly

for a front wheel and a rear wheel, respectively. Such brake assemblies may include, but are not limited to a brake drum and friction liners, or a brake disc and friction calipers. Further, each of the front wheel brake assembly and the rear wheel brake assembly is connected to a brake lever or a brake pedal for actuation.

5 For example, the brake lever may be coupled to a pair of friction liners/calipers for applying friction to each wheel of the two-wheeled vehicle, as and when the brake lever is actuated. The brake lever can be connected to the brake assembly in a variety of ways. For example, the brake lever can be connected to the brake assembly by means of a cable. In such a case, one end of the cable may be secured
10 to the brake assembly, and the other end of the cable may be secured to the brake lever. In another case, the brake lever can be connected to the brake assembly through a hydraulic means. This is generally applicable for disc brakes. Consequently, actuation of the brake lever may result in actuation of the brake assembly and subsequently, the brake may be applied.

15 **[0002]** Generally, the vehicle includes either hand-operated brakes for both the wheels or includes a combination of hand-operated and foot-operated brakes. In the latter case, generally, the front wheel brakes are hand-operated, and include a front wheel brake lever mounted on a handle of the two-wheeled vehicle for actuation, whereas the rear wheel brakes can be foot-operated lever provided near
20 a foot-rest of the rider.

[0003] Usually, during operation of the brakes, riders apply the rear wheel brake alone. Such a practice stems from the fact that actuating both the brake levers at the same time may be inconvenient for the rider. In addition, when the front wheel brake is applied, less load on the front wheel and weight transfer towards the front
25 wheel cause the front wheel to brake rapidly, and may result in a sudden jerk to the vehicle. The sudden jerk may affect the ride quality and may disturb the balance and stability of the vehicle leading to an accident. However, on the other hand, the braking force applied for breaking the rear wheel may have to be limited, to prevent skidding of the vehicle. As a result, the deceleration
30 experienced by the vehicle may also be limited and subsequently, the stopping distance of the vehicle may be significantly large.

[0004] Conventionally, in order to address the above-mentioned concerns, braking systems that allow simultaneous actuation of a front brake and a rear brake by application of a single brake lever have been developed. Such braking system is capable of uniting the braking operation of both the front wheel brake and the rear wheel brake with the help of a single brake lever, for example the synchronous brake lever. Accordingly, upon actuation of the single brake lever, such a braking system may allow distribution of braking force to the front wheel as well as the rear wheel of the vehicle. Therefore, the front wheel brake and the rear wheel brake can be simultaneously applied by actuating one brake lever, for example, the synchronous brake lever. In addition to being convenient for the rider, such braking systems may ensure that the deceleration of the vehicle can be increased and subsequently, the stopping distance may be reduced. Further, as would be understood, in two-wheeled vehicles with such braking systems, a front wheel brake lever may also be provided to independently operate the front wheel brake.

[0005] Further, in such braking systems, each cable from each of the front wheel brake lever and the synchronous brake lever may be connected to the front wheel brake assembly through an actuator as the front wheel brake assembly is operated by application of either of the brake levers.

[0006] Furthermore, in vehicles with the synchronous brake lever disposed near the foot-rest, the output from the synchronous brake lever is to be connected to the front wheel brake through a connecting means that is to be routed from the synchronous brake lever to the front wheel brake. Especially, in vehicles with a cable being used as the connecting means, there are routing challenges due to frictional losses due to sharp bends in the routing.

[0007] Moreover, conventional systems have limitations in terms of arm length of the actuator resulting in stroke loss in the cable. Further, in conventional systems arm length cannot be extended due to the mounting location, as if arm length extends there are high chances of fouling of arm length with other parts of the vehicle. Furthermore, there is need for reduction in bending of cables during actuation to improve the life and reliability of the system. As there exists a

problem of enabling dynamic movement of the cables during working the vehicle. Thus, upstream and downstream routing of the cables need to have spatial freedom with respect to the longitudinal and the lateral directions of the vehicle.

[0008] Thus, there is a need for providing a brake actuation assembly for a two-wheeler that addresses the aforementioned and other problems in the prior art. Therefore, the present subject matter is aimed at providing a brake actuation assembly that is effective and reliable.

[0009] Hence, the present subject matter provides a brake actuation assembly for a two-wheeler. The two-wheeler includes a frame member comprising a steering support structure that rotatably supports a front wheel. A front wheel brake and a rear wheel brake employed on a front wheel and a rear wheel, respectively. An intermediate brake cable connects the synchronous brake lever to an intermediate actuating member and the intermediate actuating member is disposed in vicinity of said steering support structure and is secured to said frame member. Further, the intermediate actuating member is pivotable about a pivot axis disposed at a first angle with respect to vehicle longitudinal plane, which is a vertical plane passing along the longitudinal axis. The first angle is an acute angle.

[00010] It is an aspect of the present subject matter that the synchronous braking system enables actuation of at least two brakes installed on different wheels by the operation of a single control, which is the synchronized brake lever. Moreover, the front lever is capable of independently actuating only the front brake lever.

[00011] It is a feature of the present subject matter that the front wheel brake is actuated through the intermediate actuating member through the independent brake cable or through the intermediate brake cable without affecting other brake cable. It is an advantage that the brake feel is improved.

[00012] It is another feature that the intermediate actuating member is pivotable about a rotational plane which is at a first angle with the vehicle longitudinal plane provides an improved freedom of operation. It is an advantage that the intermediate actuating member is capable of accommodating improved arm lengths from a pivot. Thus, it is an additional advantage that stroke loss in cable(s)

is reduced. Further, the present subject matter reduces bending of cables and fouling of improved arm lengths with other parts of the vehicle is avoided.

[00013] It is yet another feature that the intermediate actuating member includes the pivot axis inclined at a second angle with respect to a horizontal plane of the vehicle.

[00014] It is an additional feature that the present subject matter enables reduced cable bends. It is another advantage that any friction losses are reduced.

[00015] It is an aspect that the intermediate actuating member is mounted to a support member that pivotally supports the intermediate actuating member. It is an advantage that the intermediate actuating member rigidly supports the brake loads being transferred. It is yet another aspect that the support member includes plurality of guiding portion that secure outer cable of brake cable(s).

[00016] It an additional feature of the subject matter that the brake actuating assembly is employable on a naked motorcycle type vehicle or a step-through type motorcycle or a step-through type scooter type vehicle or a three wheeled vehicle.

[00017] It is an additional feature that the intermediate brake cable extending from the synchronous brake lever towards the intermediate actuating member provides a smooth and continuous routing thereby reducing friction loss. Moreover, the life of the cable is improved. Thus, the brake reliability is improved.

[00018] It is yet another additional feature that the present subject matter is applicable to a fixed ratio type or a dynamic ratio type synchronous braking system.

[00019] It is yet another advantage that the brake actuating system of the present subject matter is provided without interfering or fouling with other parts of the vehicle.

[00020] In one implementation, the two-wheeler is naked type motorcycle including a frame member comprising a steering support tube, a main tube extending rearwardly downward from the steering support tube, and a down tube extending inclinedly downward from the steering support structure. The frame member includes a pivot bracket connected at least one of the main tube and the

down tube. In an embodiment, a foot support structure is mounted to the pivot bracket, wherein the foot support structure includes a pair of foot pegs disposed at vehicle lateral ends. The synchronous brake lever is disposed adjacent to the foot support structure. A synchronous braking system is disposed adjacent to the
5 synchronous brake lever.

[00021] In one embodiment, an intermediate cable connected to synchronous braking system extends from the synchronous brake lever inclinedly upwards connecting to an intermediate actuating member disposed in the vicinity of the steering support tube. In another embodiment, the intermediate brake cable
10 extends from the upwardly forward from the synchronous braking system towards the intermediate actuating member. In a preferred implementation, the intermediate actuating member is disposed below the steering support structure and is adjointly disposed adjacent to the down tube.

[00022] In another implementation, the two-wheeler is step-through type
15 motorcycle or a scooter including a frame member comprising a down tube extending rearwardly downward from the steering support tube. In the step-through type motorcycle, the vehicle is provided with a foot support structure having a pair of foot pegs that is supported by the down tube. In scooter type vehicle, the foot-support structure includes a floorboard that is disposed at a step-
20 through portion. The synchronous brake lever is disposed adjacent to the foot support structure and the synchronous brake lever is connected to the synchronous braking system. The intermediate brake cable extends inclinedly upward from the synchronous brake actuating system towards the intermediate actuating member disposed in proximity to the steering support structure. In a preferred
25 implementation, the intermediate actuating member is secured to the down tube of the vehicle. Further, in scooter type vehicle, the intermediate actuating member is disposed rearward to a front panel of the scooter.

[00023] Moreover, the current subject matter is applicable to a three-wheeled vehicle having a synchronous brake lever disposed near foot support structure and
30 the frame member including a steering support structure.

[00024] These and other advantages of the present subject matter would be described in greater detail in conjunction with the figures in the following description.

[00025] Fig. 1 (a) depicts a right side view of an exemplary two-wheeler 100, in accordance with an embodiment of the present subject matter. A frontward direction is indicated by an arrow F, a rearward direction indicated by an arrow R, an upward direction indicated by an arrow Up and a downward direction indicated by an arrow Dw provided in the top of first figure. The vehicle is extending from the front direction to the rear direction along the vehicle longitudinal axis (F-R).
The direction along the vehicle longitudinal axis is termed as a vehicle longitudinal direction. In an embodiment; the two-wheeler 100 includes a frame member 105 supporting a front wheel 110 and a rear wheel 115. The front wheel 110 and the rear wheel 115 are rotatably supported by a front suspension system 120 and a rear suspension system 125. In one embodiment, the rear wheel 115 is additionally supported by a swingarm (shown in Fig. 1 (b)). The front wheel 110 is provided with a front wheel brake 130 and the rear wheel 115 is provided with a rear wheel brake 135. In the present embodiment, the front wheel brake 130 is a disc brake. However, the front wheel brake 130 can be a drum brake or the disc brake actuated using a combination of hydraulic and mechanical actuation.
Further, the two-wheeler 100 can also be termed and interchangeably used as a vehicle 100.

[00026] In the present embodiment, a power unit 140 is mounted to a front portion of the frame member 105 and is disposed substantially below a fuel tank 155 and rearward of the front wheel 110. The power unit 140 is coupled to a transmission system (not shown) for transferring power to the rear wheel 115. Further, a carburetor or a fuel injection system or the like (not shown) supplies air-fuel mixture to the power unit 140 including an internal combustion engine. Further, the front wheel 110 is rotatably supported by the frame member 105 and a handle bar assembly 150 is functionally connected to the front wheel 110 for maneuvering the vehicle. The handle bar assembly 150 supports an instrument cluster, vehicle controls including throttle, clutch, or electrical switches. Further,

the handle bar assembly 150 supports at least one brake lever 210 (shown in Fig. 1 (b)). In an embodiment, the two-wheeler 100 includes another lever (shown in Fig. 1 (b)) that is foot-operated brake.

5 **[00027]** A seat assembly 155 is mounted to the frame member 105 and disposed rearward of the fuel tank 145. The rider can operate the two-wheeler 100 in a seated position on the seat assembly 155. Moreover, the vehicle 100 includes a foot support structure FS that extends in a lateral direction of the vehicle 100 for the user to rest feet. The lateral direction of the vehicle 100 is perpendicular to the vehicle longitudinal direction.

10 **[00028]** Further, the vehicle 100 includes a front fender 160 covering at least a portion of the front wheel 110 and a rear fender 165 covers at least a portion of the rear wheel 115. Also, the vehicle 100 is provided with plurality of panels 170A, 170B mounted to the frame member 105 and covering the frame member 105 and/or parts of the vehicle 100. Also, the vehicle 100 is employed with
15 plurality of mechanical, electronic, and electromechanical system including a synchronous braking system, an anti-lock braking system, a vehicle safety system, or an electronic control system.

20 **[00029]** Fig. 1 (b) illustrates a frame member of the vehicle employed with selected parts, in accordance with the embodiment as depicted in Fig. 1 (a). A frontward direction is indicated by an arrow F, a rearward direction indicated by an arrow R, an upward direction indicated by an arrow Up and a downward direction indicated by an arrow Dw provided in the top of second figure. The vehicle is extending from the front direction to the rear direction along the vehicle longitudinal axis (F-R). The direction along the vehicle longitudinal axis is termed
25 as a vehicle longitudinal direction. In an embodiment; the frame member 105 includes the steering support structure 105A that rotatably supports a steering shaft (not shown). One end of the steering shaft is connected to front suspension system 120 having a pair of telescopic suspensions. Other end of the steering shaft is connected to the handle bar 150.

30 **[00030]** In the present implementation, the frame member 105 includes a main tube 105B extending rearward and curvedly downward from the steering support

structure 105A towards a pivot bracket 105D. Also, a down tube 105C extends inclinedly downward from the steering support structure 105A. The main tube 105B and the down tube 105C support the power unit 140 and surround at least a portion of the power unit 140. A swingarm 185 is pivotally connected to the pivot bracket 105D. The swing arm rotatably supports the rear wheel 115. Also, in the present implementation, the foot support bracket (shown in Fig. 1 (c)) is mounted to the pivot bracket 105D. The foot support bracket (shown in Fig. 1 (c)) includes a pair of foot pegs FS1 that extend laterally outward.

[00031] The vehicle 100 is provided with a synchronous brake assembly 200 that is disposed adjacent to the foot support structure FS. In an embodiment, the synchronous brake assembly 200 is mounted to the pivot bracket 105D. The synchronous brake assembly 200 includes the synchronous brake lever 210, wherein the synchronous brake assembly 200 enables actuation of at least two brakes 130, 135 installed on different wheels 110, 115 by the operation of a single control, which is the synchronized brake lever 210. The synchronous brake assembly 200 can be a static or dynamic type brake force distribution system.

[00032] The synchronous brake lever 210 is hingedly mounted adjacent to the foot support structure FS. Actuation of the synchronous brake lever 210, which is the rear brake pedal/lever 210, the synchronous brake assembly actuates the rear wheel brake 135. Also, the synchronous brake assembly 200 provides another output for actuating the front wheel brake 130. The synchronous brake assembly 200 is connected to the front wheel brake 130 through an intermediate actuating member 300 that is disposed in the vicinity of the steering support structure 105A. An intermediate brake cable 305 connects the synchronous brake assembly 200 to the intermediate actuation member 300. In other words, the synchronized brake lever 210 is functionally connected to the intermediate actuating member 300 through the intermediate brake cable 305. In a preferred embodiment, the intermediate brake cable 305 (shown in Fig. 1 (g)) extending from bottom of said foot support structure (FS) upwardly forward towards said intermediate actuating member 300 from the synchronous brake assembly 200. In another embodiment, the intermediate brake cable 305 extends from top of said foot support structure

(FS) upwardly forward towards said intermediate actuating member 300 from the synchronous brake assembly 200.

[00033] Also, the intermediate actuating member 300 is connected to an independent brake lever 205 through a front brake input cable 215. The intermediate actuating member 300 receives input from the intermediate brake cable 305 and/or front brake input cable 215, respectively, whereby the front wheel brake 130 is actuated through a front brake output cable 220 connecting the intermediate actuating member 300 and the front wheel brake 130.

[00034] Fig. 1 (c) depicts an enlarged view of the frame member 105, in accordance with the embodiment of Fig. 1 (b). A frontward direction is indicated by an arrow F, a rearward direction indicated by an arrow R, an upward direction indicated by an arrow Up and a downward direction indicated by an arrow Dw provided in the top of third figure. The vehicle is extending from the front direction to the rear direction along the vehicle longitudinal axis (F-R). The direction along the vehicle longitudinal axis is termed as a vehicle longitudinal direction. In an embodiment; the intermediate actuating member 300 is disposed in proximity to the steering support structure 105A. In the present implementation, the intermediate actuating member 300 is disposed below the steering support structure 105A and is adjointly mounted to the down tube 105C of the frame member 105. In the present implementation, the intermediate actuating member 300 is mounted to a support bracket 400. The support bracket 400 is affixed to the frame member 105 and the support bracket 400 hingedly supports the intermediate actuating member 300. The intermediate actuating member 300 is pivotable about a hinge axis X-X'. The hinge axis X-X' is also being termed and interchangeably used as the pivot axis X-X'. In one implementation, the hinge axis X-X' is parallel to a longitudinal plane of the vehicle 100. The longitudinal plane is a vertical plane passing along the longitudinal axis (F-R) of the vehicle 100. In other words, the motion of the intermediate actuating member 300 is in a lateral plane. The lateral plane is orthogonal to the longitudinal plane. Also, the frame member 105 includes a reinforcement member 105E connected to the steering support structure 105A and

is sandwiched between the main tube 105B and the down tube 105C. In one embodiment, the intermediate actuating member 300 is supported by the reinforcement member 105E.

[00035] In another implementation, a rotational plane includes axis Y-Y $\square$ which is at a first angle (Θ) with respect to the longitudinal plane of the vehicle 100, wherein the first angle (Θ) varies within the range of 30-90 degrees. In a preferred embodiment, the first angle (Θ) is 90 degrees. The longitudinal plane is the plane which includes the hinge axis X-X $\square$. Axis Y-Y $\square$ is substantially passing along the rotational plane.

[00036] Fig. 1 (d) depicts a perspective view of the intermediate actuating member 300, in accordance with the embodiment of Fig. 1 (b). A frontward direction is indicated by an arrow F, a rearward direction indicated by an arrow R, an upward direction indicated by an arrow Up and a downward direction indicated by an arrow Dw provided in the top of fourth figure. The vehicle is extending from the front direction to the rear direction along the vehicle longitudinal axis (F-R). The direction along the vehicle longitudinal axis is termed as a vehicle longitudinal direction. In an embodiment; the intermediate actuating member 300 includes an aperture portion 300C for pivotally or hingedly mounting the intermediate actuating member 300. In the present embodiment, the aperture portion 300C is hollow cylindrical structure that is integrally formed. Further, the intermediate actuating member 300 includes at least two arms 300A, 300B. A first arm 300A extends towards a lateral side of the vehicle where the synchronous brake lever 210 is disposed. Another arm 300B extends in a direction away from the first arm 300A. The first arm 300A includes a first input portion 300AA to which the intermediate brake cable 305 is connected. The second arm 300B includes a second input portion 300BA to which the front brake input cable is connected. The first input portion 300AA and the second input portion 300BA are provided with angularly elongated apertures that provide free play. Also, the second arm 300B includes an output portion 300BB to which the front brake output cable is connected. In the present embodiment, the first arm 300A includes at least two parallel disposed sheet members. Similarly, the second arm 300B

includes at least two parallel disposed sheet members. The parallel disposed sheet members provide structural strength for the intermediate actuating member 300. As the intermediate actuating member 300 is rotating in the rotational plane, the intermediate brake cable 305 extending from the synchronous brake lever 210
5 towards the intermediate actuating member 300 provides a smooth and continuous routing thereby reducing friction loss. Moreover, the life of the cable is improved. Thus, the brake reliability is improved. Furthermore, due to the intermediate actuating member 300 disclosed in the present subject matter an optimal arm length 300A, 300B is easily achievable without interfering or fouling of the arm
10 length 300A, 300B with other parts of the vehicle.

[00037] Fig. 1 (e) depicts the support bracket 400 in accordance with the embodiment of Fig. 1 (b). A frontward direction is indicated by an arrow F, a rearward direction indicated by an arrow R, an upward direction indicated by an arrow Up and a downward direction indicated by an arrow Dw provided in the top
15 of fifth figure. The vehicle is extending from the front direction to the rear direction along the vehicle longitudinal axis (F-R). The direction along the vehicle longitudinal axis is termed as a vehicle longitudinal direction. In an embodiment; the support bracket 400 includes a base portion 400B that supports a pivot member 400BA. In a preferred embodiment, the pivot member 400BA is
20 cylindrical member that extends outwards and is capable of receiving the aperture portion of the intermediate actuating member 300. Also, the base portion includes plurality of guide portions 400GA, 400GB, and 400GC that are provided on the support bracket 400. A first guide portion 400GA is provided on one lateral bottom portion of the base portion 400B. In an embodiment, the intermediate
25 brake cable 305 includes an inner brake cable (not shown) and an outer brake cable (not shown), wherein the outer brake cable is secured to the first guide portion 400GA. A second guide portion 400GB and a third guide portion 400GC are provided on other side of the support member 400. One end of each of the outer cables of front brake input cable 215 and the front brake output cable 220
30 are secured to the second guide portion 400GB and the third guide portion 400GC.

- [00038] Further, the support bracket 400 includes one or more arms 400A, 400C that extend away from the pivot portion 400BA. In another embodiment, the pivot portion 400BA is also be part of the frame member 105C itself. In the present embodiment, a first arm 400A and a second arm 400B are provided that extend
5 away from the base portion 400B and are integrally formed with the base portion 400B. In the present embodiment, the support bracket 400 is disposed in vicinity of the steering support structure 105A and the base portion 400B of the support bracket 400 substantially abuts the down tube 105C. The arms 400A, 400C of the support bracket 400 extend adjacently of the down tube 105C and covering at
10 least a portion of the reinforcement member 105E. Each arm 400A, 400C is provided one or more mounting apertures 400M. In a preferred embodiment, the support bracket 400 is secured to the reinforcement member 105E. In order to appreciate the mounting assembly, Fig. 1 (f) depicts an exploded view of the intermediate actuating member 300 being mounted to the frame member 105.
- 15 [00039] The support bracket 400 is disposed below the steering support structure 105A and is disposed adjointly ahead of the down tube 105C. The arms 400A, 400C of the support bracket 400 extends adjacent to either lateral sides of the reinforcement member 105E. Through the mounting apertures 400M, the support bracket 400 is secured to the reinforcement member 105E by means of
20 fasteners. However, the support bracket 400 can be secured to the reinforcement member 105E through any known securing methods including snap-fit or welding. Further, the intermediate actuating member 300 is pivotally or hingedly mounted to the support bracket 400.
- [00040] Fig. 1 (f) depicts an exploded view of the actuation assembly, in
25 accordance with the embodiment of Fig. 1 (c). A frontward direction is indicated by an arrow F, a rearward direction indicated by an arrow R, an upward direction indicated by an arrow Up and a downward direction indicated by an arrow Dw provided in the top of sixth figure. The vehicle is extending from the front direction to the rear direction along the vehicle longitudinal axis (F-R). The
30 direction along the vehicle longitudinal axis is termed as a vehicle longitudinal direction. In an embodiment; the support bracket 400 is a U-shaped member

secured to the reinforcement member 105E of the frame member 105. However, the present subject matter not only deals with the support bracket 400 of U-shaped but the support bracket 400 can be of any shape as per the location and mounting of the support bracket 400. In the present implementation, the support bracket 400 is secured to the frame member 105 through the arms 400A, 400C (as shown in Fig. 1 (e)) using fasteners F. The base portion 400B of the support bracket 400 is provided with a pivot member 400BA that is in line with the pivot axis X-X'. The orientation of the pivot member 400BA defines the orientation of the intermediate actuating member 300. The intermediate actuating member 300 is pivotally mounted to the pivot member 400BA. Further, a fastening member 405 is provided secure and to restrict the motion of the intermediate actuating member 300 along the axis X-X'. In an implementation, the fastening member 405 is C-clip or the like. The present implementation provides an improved and reliable functioning synchronous braking system.

[00041] Fig. 1 (g) depicts a front perspective view of the two-wheeler having a synchronous braking system and an actuating braking assembly, in accordance with the embodiment as depicted in Fig. 1 (b). A frontward direction is indicated by an arrow F, a rearward direction indicated by an arrow R, an upward direction indicated by an arrow Up and a downward direction indicated by an arrow Dw provided in the top of seventh figure. The vehicle is extending from the front direction to the rear direction along the vehicle longitudinal axis (F-R). The direction along the vehicle longitudinal axis is termed as a vehicle longitudinal direction. In an embodiment; the actuation of the synchronous brake lever 210 actuates the synchronous braking system 200 actuates a front wheel brake output and a rear wheel brake output (not shown). The rear wheel brake 120 is actuated directly by the synchronous braking system. The front wheel brake 130 is actuated by the intermediate actuating member 300 that is connected to the synchronous brake system 200 through the intermediate brake cable 305.

[00042] The intermediate brake cable 305 extends upwardly forwards in a smooth and a continuous manner. An outer cable of the intermediate brake cable 305 is securely fixed to the synchronous braking system 200 and the support

bracket 400, thereby providing motion of the inner cable during actuation of the synchronous brake lever 210. The synchronous braking system 200 in the present implementation provides a pulling force to the intermediate brake cable 305. Thus, the intermediate brake cable 305 pulls the intermediate actuating member
5 300 downward through the first arm 300A. This results the intermediate actuating member 300 to pivot whereby the second arm 300B moves upward thereby actuating the front wheel brake 130. Also, the pivot axis X-X' being disposed at the first angle (Θ) with respect to the vehicle longitudinal plane for enabling provision of optimal arm length 300A, 300B thereby providing effective stroke.
10 Moreover, in other embodiment, where the frame member 105 is of some different pattern then the pivot axis X-X' can be disposed at a second angle with respect to a horizontal plane thereby providing improved freedom of orientation and also enables compact packaging.

[00043] Many modifications and variations of the present subject matter are
15 possible within the spirit and scope of the present subject matter, in the light of above disclosure.

I/ We claim:

1. A two-or three wheeled vehicle (100), said vehicle (100) comprising: a frame member (105) comprising of a steering support structure (105A), a foot support structure (FS) mounted to said vehicle (100), a synchronous brake lever (210) disposed adjacent to said foot support structure (FS), said synchronous brake lever (210) is capable of actuating a front wheel brake (130) provided on a front wheel (110) and a rear wheel brake (135) provided on a rear wheel (115), and an intermediate actuating member (300) disposed in vicinity of said steering support structure (105A) and is secured to said frame member (105), said intermediate actuating member (300) is pivotable about a rotational plane which is at a first angle (Θ) with respect to longitudinal plane of said vehicle (100).
2. The vehicle (100) as claimed in claim 1, wherein said intermediate actuating member (300) is pivotally secured to a support bracket (400), and said support bracket (400) is adjoining at least one of a down tube (105C) extending downward from said steering support structure (105A) of said frame member (105).
3. The vehicle (100) as claimed in claim 1, wherein a pivot member (400BA) is extended in the support bracket (400) to receive the aperture portion of the intermediate actuating member (300).
4. The vehicle (100) as claimed in claim 1, wherein said synchronous brake lever (210) is functionally connected to said intermediate actuating member (300) through an intermediate brake cable (305) extending from top of said foot support structure (FS) upwardly forward towards said intermediate actuating member (300).
5. The vehicle (100) as claimed in claim 1, wherein said synchronous brake lever (210) is functionally connected to said intermediate actuating member (300) through an intermediate brake cable (305) extending from bottom of said foot support structure (FS) upwardly forward towards said intermediate actuating member (300).

6. The vehicle (100) as claimed in claim 1, wherein said synchronous brake lever (210) is a part of a synchronous brake assembly (200), and said synchronous brake assembly (200) is mounted on a pivot bracket (105D).
7. The vehicle (100) as claimed in claim 1, wherein said intermediate actuating member (300) rotates in said rotational plane, said rotational plane includes Y-Y' axis which is at said first angle (Θ) with respect to the longitudinal plane of said vehicle (100).
8. The vehicle (100) as claimed in claim 1, wherein said first angle (Θ) varies in range of 30-90 degrees.
9. The vehicle (100) as claimed in claim 1, wherein said intermediate actuating member (300) includes at least two arms (300A, 300B).
10. A method of operating an intermediate actuating member (300) for a synchronous brake assembly (200) of a vehicle (100) comprising:
 - actuating a synchronous brake lever (210);
 - providing a pulling force to an intermediate brake cable (305) during actuation of the synchronous brake lever (210);
 - downwardly pulling a first arm (300A) of the intermediate actuating member (300) through the pulling force of the intermediate brake cable (305);
 - rotating the intermediate actuating member (300) about a rotational plane which is at a first angle (Θ) with respect to longitudinal plane of the vehicle (100); and
 - causing a second arm (300B) of the intermediate actuating member (300) to move upwardly for actuating a front wheel brake (130) of the vehicle (100).
11. The vehicle (100) as claimed in claim 1, wherein said frame member (105) includes a reinforcement member (105E) connected to said steering support structure (105A) and sandwiched between said main tube (105B) and said down tube (105C), wherein said support bracket (SB) is affixed to said reinforcement member (105E).
12. The vehicle (100) as claimed in claim 1, wherein said intermediate actuating member (300) connects the synchronous brake assembly (200) to the front wheel brake (130).

13. The vehicle (100) as claimed in claim 1, wherein said intermediate actuating member (300) is connected to an independent brake lever (205) through a front brake input cable (215).
14. The vehicle (100) as claimed in claim 1, wherein said foot support structure (FS) includes a pair of foot pegs (FS1, FS2) disposed at lateral end(s) (RH-LH)

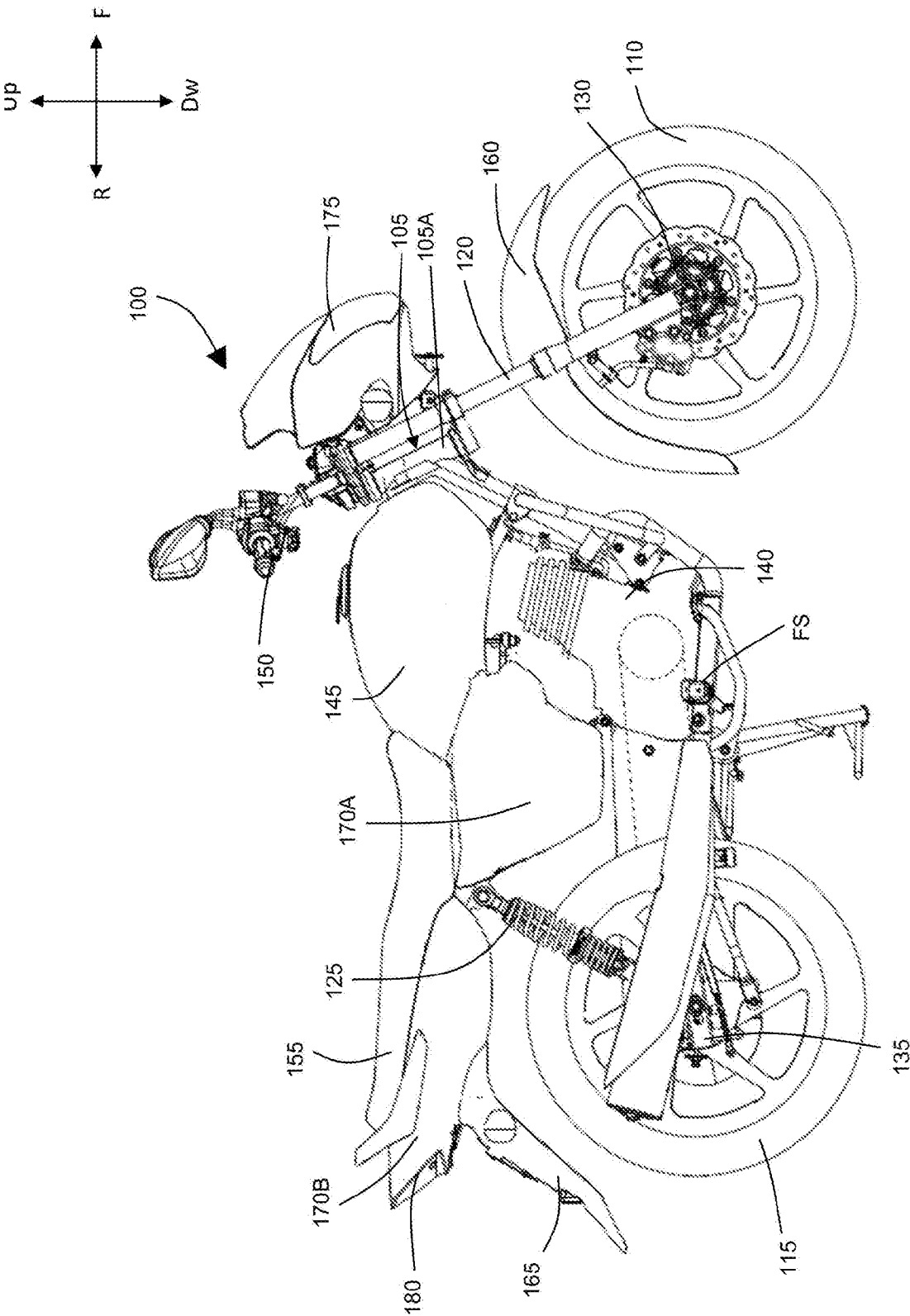
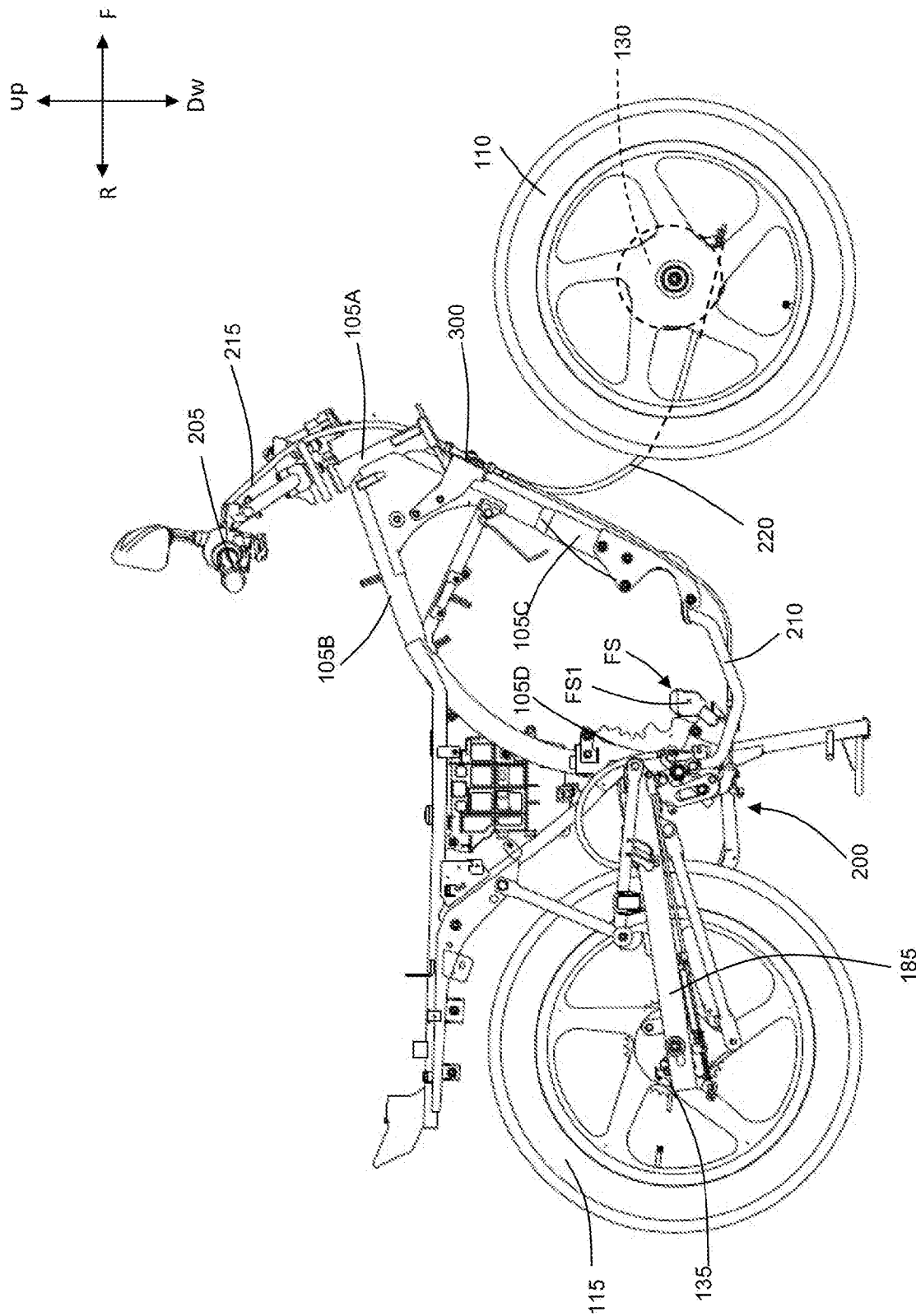


Fig. 1 (a)



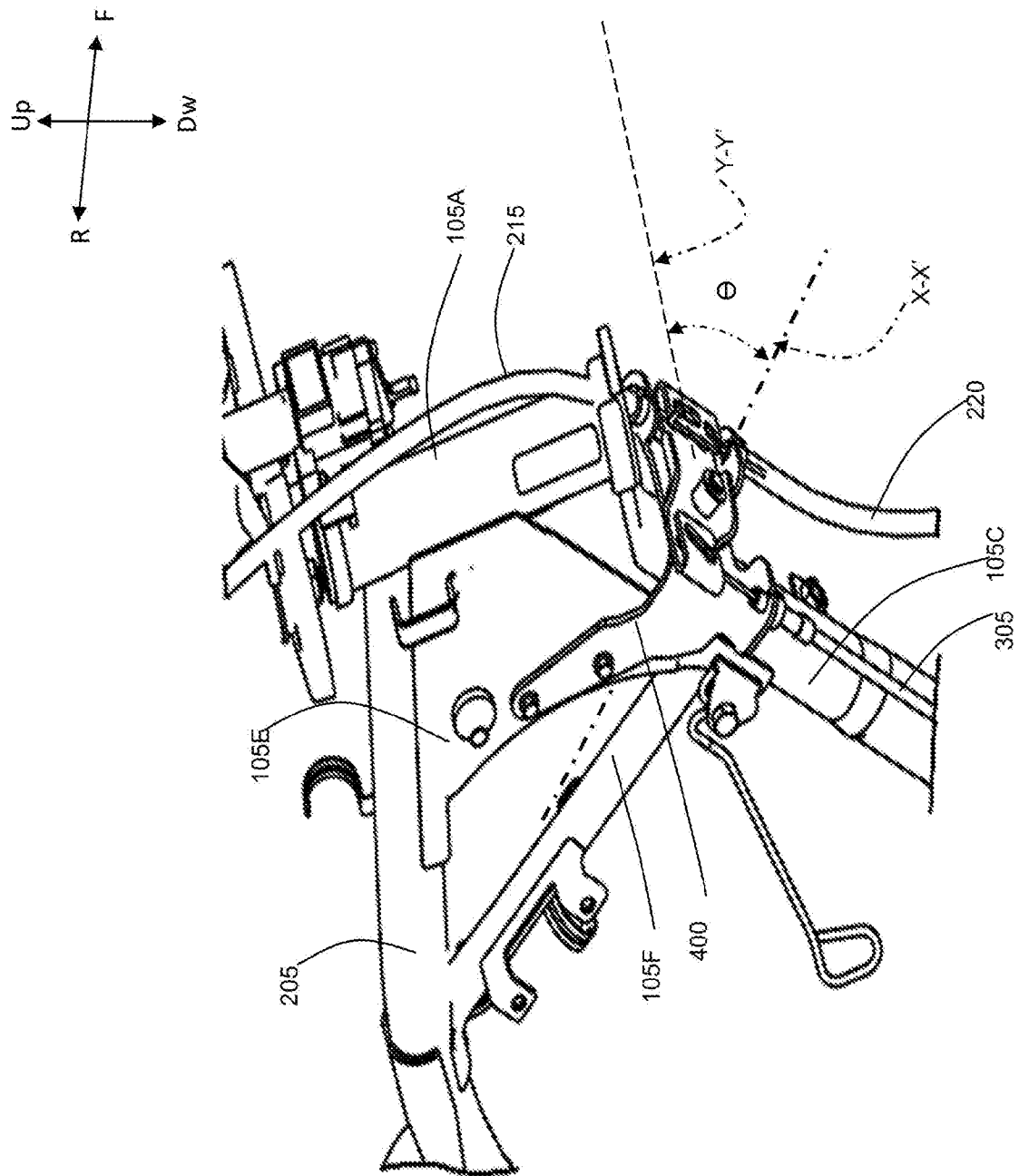


Fig. 1 (c)

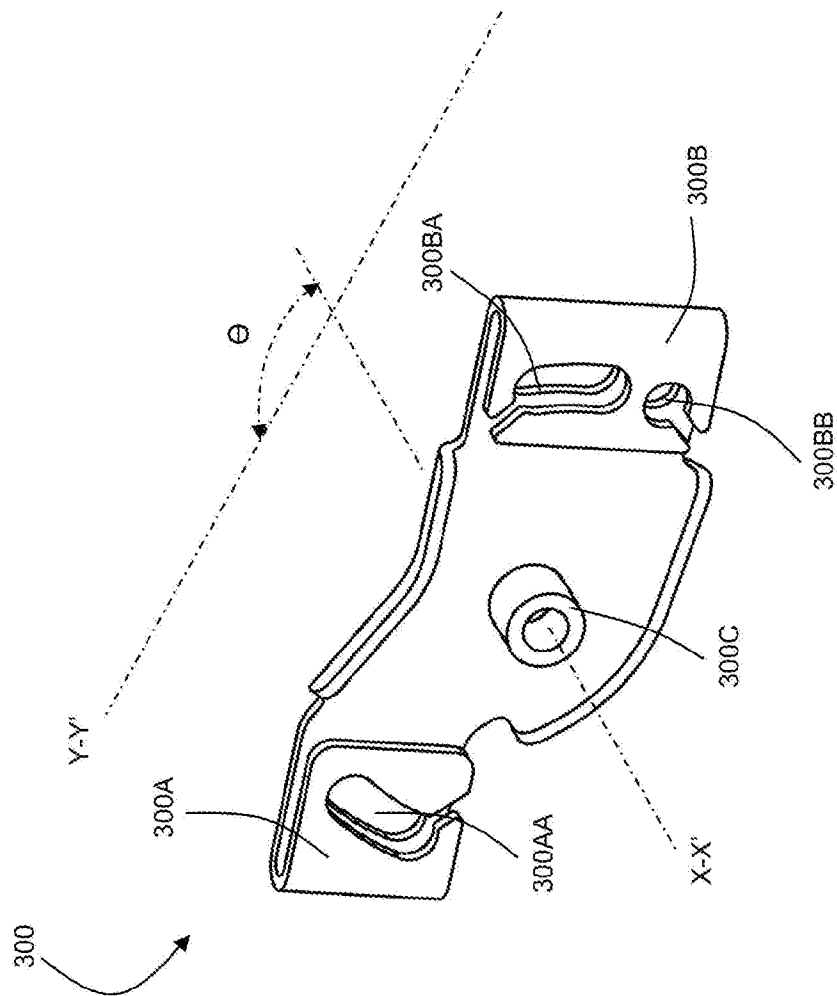


Fig. 1 (d)

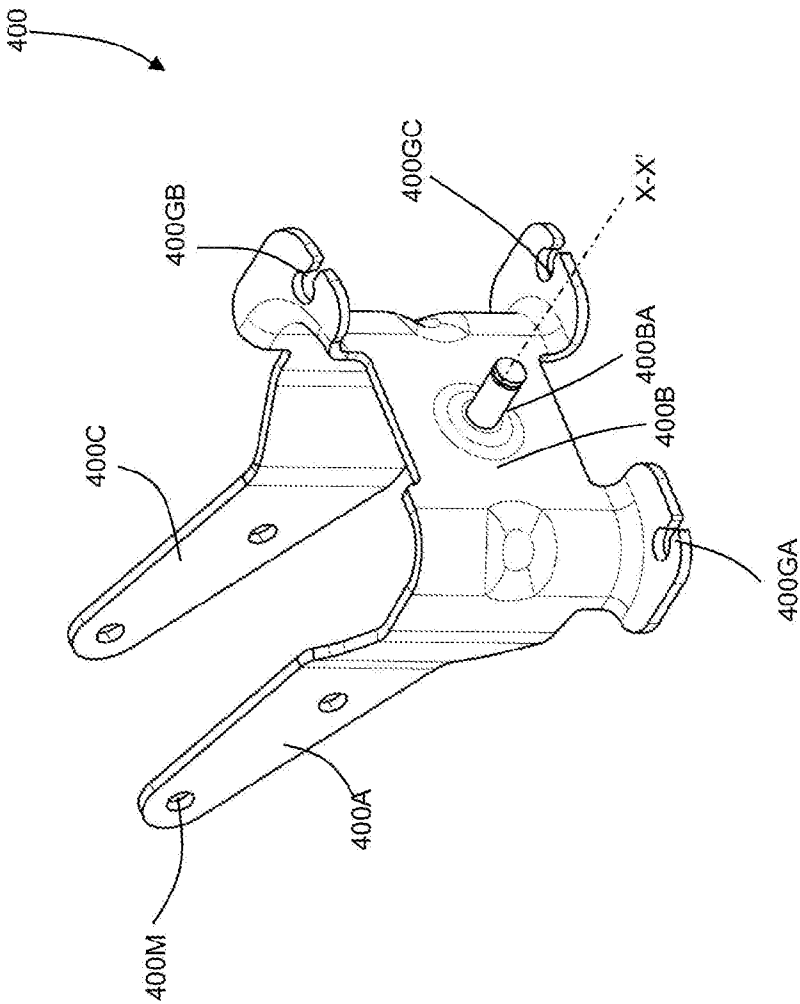


Fig. 1 (e)

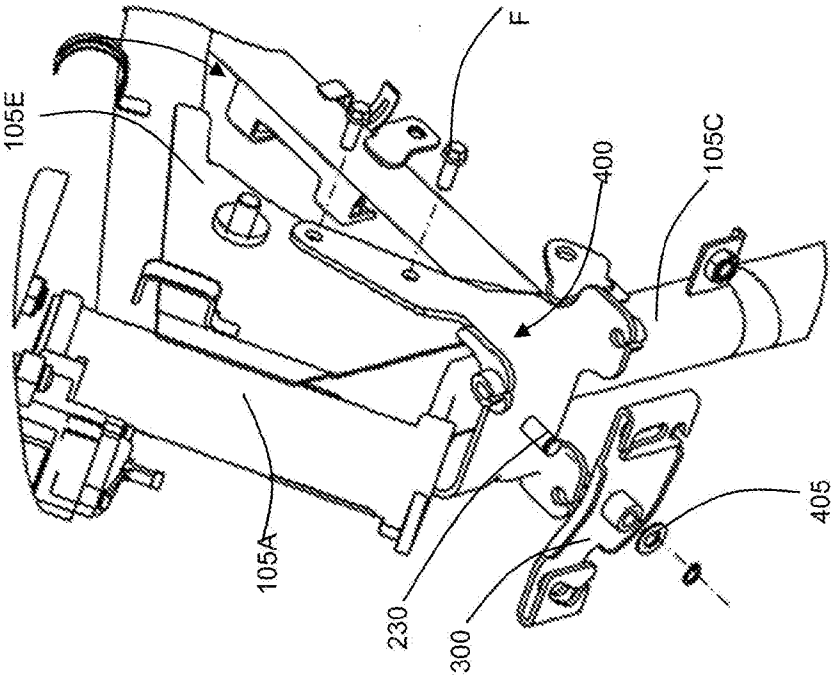
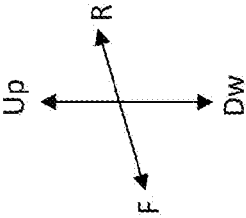


Fig. 1 (f)

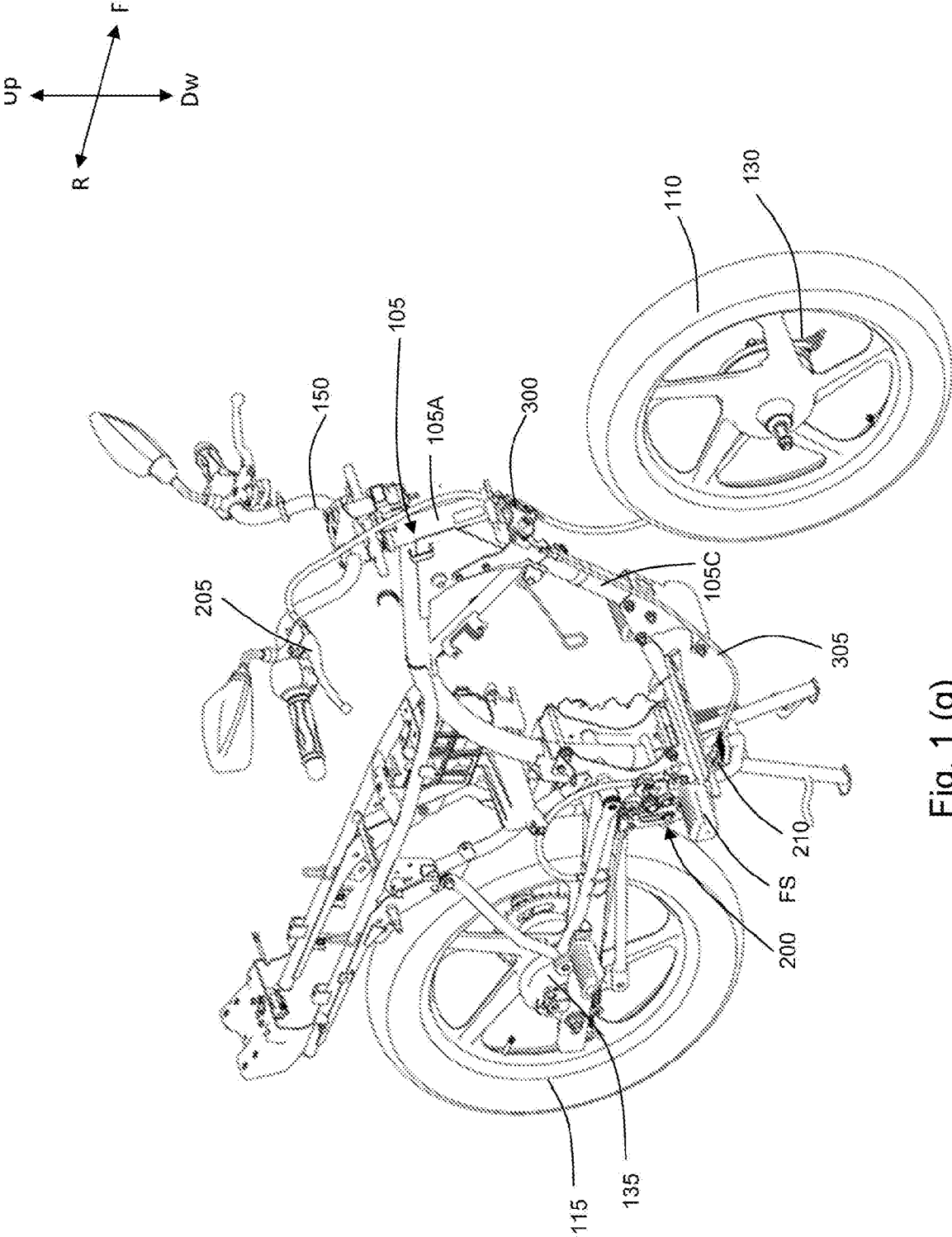


Fig. 1 (g)

INTERNATIONAL SEARCH REPORT

International application No.
PCT/IB2017/057936

A. CLASSIFICATION OF SUBJECT MATTER
B62L3/08, B62K19/38 Version=2018.01

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

B62L, B62K

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

Patseer, IPO Internal Database

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO2014147900 A1 (HONDA MOTOR CO LTD) 25 September 2014 (25.09.2014) Para [0026]-[0039], Figure 1-4	1-3, 6-9, 11-14
Y	Para [0026]-[0039], Figure 1-4	4-5, 10
Y	US2014015221 A1 (YAMAHA MOTOR CO LTD) 16 January 2014 (16.01.2014) Para [0032]-[0033], [0058]-[0062], [0086]-[0092], Figure 2-3	4-5, 10

☐ Further documents are listed in the continuation of Box C. ☒ See patent family annex.

* Special categories of cited documents:	"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
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"O" document referring to an oral disclosure, use, exhibition or other means	
"P" document published prior to the international filing date but later than the priority date claimed	"&" document member of the same patent family

Date of the actual completion of the international search
26-03-2018

Date of mailing of the international search report
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INTERNATIONAL SEARCH REPORT
Information on patent family members

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PCT/IB2017/057936

Citation	Pub.Date	Family	Pub.Date
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		PH 12015502171 A1	25-01-2016
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