



(51) International Patent Classification:

F16D 51/22 (2006.01) B62K 23/08 (2006.01)

B62K 3/04 (2006.01)

(21) International Application Number:

PCT/IN2020/050300

(22) International Filing Date:

28 March 2020 (28.03.2020)

(25) Filing Language:

English

(26) Publication Language:

English

(30) Priority Data:

201941012976 31 March 2019 (31.03.2019) IN

(71) Applicant: TVS MOTOR COMPANY LIMITED

[IN/IN]; "Jayalakshmi Estates", No. 29 (Old No. 8), Haddows Road, Chennai, 600 006 (IN).

(72) Inventors: DHEVARAJ, Selvam; TVS Motor Company Limited, "Jayalakshmi Estates", No. 29 (Old No. 8), Haddows Road, Chennai, 600 006 (IN). AGATHIYAN, Arumugam; TVS Motor Company Limited, "Jayalakshmi Estates", No. 29 (Old No. 8), Haddows Road, Chennai, 600 006 (IN). KAKKANATTU MATHEWS, Winney; TVS Motor Company Limited, "Jayalakshmi Estates", No. 29 (Old No. 8), Haddows Road, Chennai, 600 006 (IN). VENKATA MANGA RAJU, Karnam; TVS Motor Company Limited, "Jayalakshmi Estates", No. 29 (Old No. 8), Haddows Road, Chennai, 600 006 (IN). RAGHAVAN, Venkatesan; TVS Motor Company Limited, "Jayalakshmi Estates", No. 29 (Old No. 8), Haddows Road, Chennai, 600 006 (IN).

(81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM,

AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DJ, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IR, IS, JO, JP, KE, KG, KH, KN, KP, KR, KW, KZ, LA, LC, LK, LR, LS, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SA, SC, SD, SE, SG, SK, SL, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, WS, ZA, ZM, ZW.

(84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, ST, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, KM, ML, MR, NE, SN, TD, TG).

Declarations under Rule 4.17:

- as to the identity of the inventor (Rule 4.17(i))
- of inventorship (Rule 4.17(iv))

Published:

- with international search report (Art. 21(3))
- before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments (Rule 48.2(h))

(54) Title: A SUPPORT ASSEMBLY FOR A ROTATING MEMBER

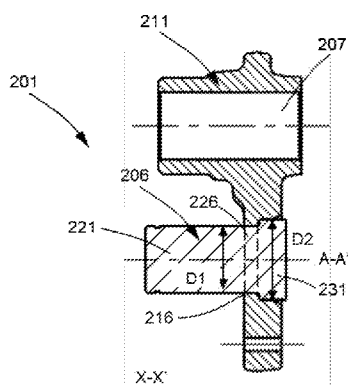


Fig. 6

(57) **Abstract:** The present subject matter provides a support assembly (201) for a motor vehicle. The support assembly (201) capable of rotatably supporting a rotating member (186). At least one pivot support member (206) of the support assembly (201) includes a supporting portion (221), and a securing portion (226). The securing portion (226) is at least partially accommodated at the aperture portion (216) of the base member (211). The securing portion (226) includes at least a portion forming a first portion (231), and the first portion (231, 232) is configured to have a thickness greater than a thickness of the supporting portion (221, 222). Thus, the support assembly of the presents subject matter offers a reliable system that is cost effective in terms of manufacturing and in terms of maintenance.

A SUPPORT ASSEMBLY FOR A ROTATING MEMBER

TECHNICAL FIELD

[0001] The present subject matter relates to automotive vehicles and more particularly, but not exclusively, relates to a support assembly for a rotating member in the automotive vehicles.

BACKGROUND

[0002] Generally, commuter vehicles like two-wheeled or three-wheeled automotive vehicles are popular for their ease of use and for their low cost of maintenance. Such automotive vehicles are provided with a power unit like an internal combustion engine or an electric traction motor to provide the desired torque and power. The power unit includes multiple rotating members that are securely supported on a crankcase or a casing depending on the type of power unit.

[0003] Typically, the automotive vehicles are provided with various systems like the braking system that help in reducing the speed of vehicle or bringing the vehicle to stand-still condition. Various systems like the braking systems require an input from the user for the system to be functional, unlike some ON-OFF type systems present in the vehicle. For example, the user has to apply braking force on a lever/pedal that gets translated to the wheels, wheel brakes to be specific, for reducing the speed of the vehicle or for bringing the vehicle to a standstill condition. In the art, hydraulic systems, like the hydraulic brakes, are used in the four-wheeled vehicles like the cars, which require less effort for application of brake. Such systems are adapted to the two-wheeled or three-wheeled vehicle, that require less effort for actuation and at the same time offer effective braking. However, such systems are complex as they involve complex hydraulic systems and piston components that make the system expensive in terms of initial cost and further, the cost of maintenance. Further hydraulic brake system is sensitive to the bleeding to avoid any air entrapment during assembly or service which requires higher skill, complex equipment & if not executed with due care can lead to risk / fatal accident to the rider. Often, such equipment or skill is not available in all

market segments as compared to the simple skill & equipment for a mechanical brake system.

[0004] For aforementioned and other reasons in the art, mechanical type of braking systems is still popular in small capacity vehicles due to their ease of maintenance and their low initial cost. Moreover, such mechanical type of braking systems may offer better feedback during application of the brakes, which offers better rider feel and riding experience. However, such conventional systems are also subjected to high braking forces, which may affect the life of the parts. Thus, the challenge is to provide a support assembly that is having longevity and that offers reliable operation in systems like the mechanical braking system and other similar systems that receive such higher forces.

BRIEF DESCRIPTION OF THE DRAWINGS

[0005] The detailed description is described with reference to the accompanying figures. In the figures, similar numbers are used throughout the drawings to reference like features and components.

[0006] Fig. 1 illustrates a right side view of an exemplary a two-wheeled vehicle, in accordance with an embodiment of the present subject matter.

[0007] Fig. 2 illustrates a schematic view of the synchronized braking system, in accordance with the embodiment of the present subject matter.

[0008] Fig. 3 illustrates an exploded view of the synchronized braking system, in accordance with another embodiment of the present subject matter.

[0009] Fig. 4 depicts a perspective view of a support assembly, in accordance with an embodiment of the present subject matter.

[00010] Fig. 5 depicts an exploded view of a supporting assembly, in accordance with an embodiment of the present subject matter.

[00011] Fig. 6 depicts a sectional view of the support assembly taken along axis X-X' as depicted in Fig. 4, in accordance with an embodiment of the present subject matter.

[00012] Fig. 7 depicts a sectional view of a base member taken along axis Y-Y' as depicted in Fig. 5, in accordance with an embodiment of the present subject matter.

[00013] Fig. 8 depicts a perspective of another support assembly, in accordance with an embodiment of the present subject matter.

[00014] Fig. 9 depicts a sectional view of the support assembly taken along axis Z-Z' as depicted in Fig. 8, in accordance with an embodiment of the present subject matter.

DETAILED DESCRIPTION

[00015] Conventionally, some rotating parts like brake pedal or brake lever are mounted to a base member, which can be a frame member. A rotating member like the brake lever is supported on the base member through a suitable holding means, such as a pin member. Generally, a clearance fit is provided between the pin and the base member. Further, the pin is welded to the base member on one side. In such systems, the pin and the base member helps in supporting the brake lever weight and are capable of withstanding the force exerted by the user on the brake lever. Some vehicles may use longer brake levers because of which the force on pin is higher than the force exerted by the user.

[00016] The brake lever is one the parts that is frequently operated by the user. To put in perspective, an ignition key of the vehicle is operated only during start and stop of the power unit, which does not require excessive force. However, the brake lever is operated multiple times between the start and stop of the vehicle, considering an average riding pattern of the user. Besides, the force applied may be excessive when the vehicle is operated at higher speeds or if the user requires a standstill condition within a short distance. Clearly, the braking system is one of the most frequently operated systems in the vehicle. Thus, during such frequent application of braking forces, the connection between the pin and base member, generally done through welding, gets affected as it is done only on one side. Moreover, the pin may be protruding only on one side of the base member where the brake lever is supported and the welding is performed on the other side with

insufficient weld penetration due to chamfered designs. Therefore, in such cases where the pin is not protruding out from the base member, when the brake lever is applied to perform braking operation, the pin may start bending due to the smaller portion of the welding between the base member and the pin. This results in
5 fusing of the weld portion and whereby the load reaches the weld portion. By the term ‘fusing’ it is implied that the weld portion acts as part of the load receiving member by acting as single entity. Consequentially, with time, the weld portion starts yielding because of which any reactive force from the brake lever goes to the base member on which the brake lever is abutting. This results in bending of
10 the pin. Further, the base member may also get cracks, for example, when parts like forged parts are used. Thus, the resulting failure of the pin and the base member affects the overall braking system of the vehicle, which not only jeopardizes the safety of the occupants of the vehicle, but also put the adjacent vehicles in risk.

15 **[00017]** Moreover, the bending of the pin affects the orientation of the brake lever. The change in orientation of the brake lever, due to the bending of the pin, typically affects the unactuated position of the brake lever. Thus, the rider may experience uncomfortable riding due to changes in the position of the brake lever, which is different from the registered position of the brake lever by the user.
20 Moreover, the altered position/orientation of the brake lever would also result in altered operating scenario of the brake lever, which would not provide the desired braking response. For example, if the user is habituated to application of brake lever by “x” degrees to reduce the speed by “y” kmph, the change in orientation of the brake lever may not offer the reduction of speed to “y” kmph, because of
25 which the user may undergo poor riding experience.

[00018] Additionally, the change in orientation may affect the distribution ratio in braking system like the synchronized/ harmonized braking system. Primarily, such synchronized braking systems may include additional parts other than the brake lever, which would add weight to the system when compared to a
30 conventional braking system. This would also add additional load/force on the pin.

[00019] Thus, failure of the parts of the braking system may require replacement of the parts, which would make the maintenance of the vehicle costlier. Besides, some solutions in the art still have weight/material related challenges making the assembly costlier and warranting more space on the vehicle. Some other solutions known in the art suggest welding on both sides instead of one. This may affect the structural integrity of the parts in terms of strength and in terms of desired orientation. Further, two-sided welding again adds to the cost. Moreover, welding on the side of the base member that interacts with the brake pedal would hinder smooth functioning of the brake pedal as welding would result in uneven portions of the base member. Also, riveting may be used for fixing the pin to the base member providing better finish when compared to the uneven finishing offered by welding, which reduces hindrance related short coming. However, riveting for securing such parts is expensive & complex process compared to welding. Thus, there is a need for a system/assembly that is reliable and at the same time is cost effective and feasible for manufacturing.

[00020] Hence, the present subject matter is aimed at addressing the aforementioned and other problems in the prior arts. Hence, the present subject matter provides a support assembly, which is having longevity and longer life. Also, the present subject offers ease of manufacturing. Further, the present matter reduces maintenance cost whereby it reduces the frequency of parts replacement.

[00021] It is a feature that, in one embodiment, the support assembly includes at least one pivot support member secured to a base member. In one embodiment, at least one pivot support member of the support assembly is configured to rotatably support at least one rotating member. The at least one pivot support member, has at least a portion, accommodated in a base member of the support assembly. The pivot support member is having a variable thickness with a thickness of the of the portion adjoining the base member being greater than rest of the pivot support member.

[00022]

[00023] It is a feature that, in one embodiment, the pivot support member includes a supporting portion and a securing portion. The securing portion includes at least a portion forming a first portion and the first portion is configured to have a thickness greater than a thickness of the supporting portion. Thus, the
5 securing portion with the first portion with greater contact area offers improved load sharing thereby reducing or eliminating bending of the pivot support member.

[00024] It is a feature that, in one embodiment, the securing portion with at least a first portion provides a stepped profile thereof, whereby the pivot support
10 member is disposed to have contact surface in two radial planes and in one vertical plane thereby improving contact area.

[00025] It is a feature that, in one embodiment, the effective load sharing between the pivot support member and base member reduces load on the weld portion thereby reducing or eliminating fusing of the weld portion and thereby
15 eliminating failure of weld portion (joint). By the terms 'fusing of the weld portion' it is implied that the weld portion forms part of the load bearing members, which is eliminated in the present subject matter.

[00026] It is a feature that, in one embodiment, supporting portion is configured to have a cylindrical profile to enable rotatable supporting of a rotating member
20 like brake-lever. Further, the securing portion may have any known regular or irregular geometrical profile depending on the design requirement.

[00027] It is a feature that, in one embodiment, the amount of excess material used for first portion is effectively reduced from the aperture portion, at the receiving portion, on the base member thereby offering zero net material addition.
25 Thus, the current design does not warrant any additional material usage.

[00028] It is a feature that, in one embodiment, the aperture portion is provided with a stepped profile to complement and accommodate the stepped profile of the pivot support member, wherein the stepped profile enables ease of assembly in axial direction as the pivot support member can be at a desired position.

[00029] It is a feature that, in one embodiment, the pivot support member and the base member are welded on one side, the side which is opposite to the side the rotating member is supported. Thus, the present subject matter does not require welding on both sides of the support assembly.

- 5 [00030] It is a feature that, in one embodiment, one the pivot support member or the base member is provided with a chamfered portion that enables deep penetration of weld thereby providing rigid support assembly.

[00031] It is a feature that, in one embodiment, the pivot support member includes a protruded portion provided on the side the rotating member is disposed,
10 wherein the protruded portion eliminates direct contact between the base member and the rotating member whereby the action force from rotating member and the reaction force from the base member are acting only on the pivot support member thereby providing equilibrium.

[00032] It is a feature that, in one embodiment, the present subject matter
15 utilises the low-cost welding process when compared to other expensive processes like riveting or dual side welding, for securing, whereby the cost of manufacturing is kept lower relatively.

[00033] It is a feature that the support assembly offers reliable operation as well as reduced maintenance cost for the user as frequent replacement of parts is
20 eliminated.

[00034] It is a feature that the bending of the pivot support member or breaking of the base member is reduced/eliminated whereby the optimum functioning of the system like the complex braking system is retained whereby the safety and riding feel are improved.

25 [00035] These and other advantages of the present subject matter would be described in greater detail in conjunction with an embodiment of a two wheeled saddle type motorcycle with foot operated rear brake with the figures in the following description.

[00036] Fig. 1 depicts a right-side view of an exemplary vehicle 100, in
30 accordance with an embodiment of the present subject matter. The vehicle 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 front suspension system 120 and the rear suspension system 125, respectively. In one embodiment, the rear wheel 115 is additionally supported by a swingarm (not shown). 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. The front wheel brake 130 and the rear wheel brake 135 is one of a disc brake or a drum brake.

[00037] 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 storage unit 145 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. The power unit 140 can be an internal combustion engine and/or an electric motor. Further, the front wheel 110 is pivotably supported by the frame member 105 and a handlebar assembly 150 is functionally connected to the front wheel 110 for maneuvering the vehicle 100. The handlebar assembly 150 supports an instrument cluster, vehicle controls including throttle, clutch, or electrical switches. Further, the handlebar assembly 150 supports at least one brake lever 151. The vehicle 100 includes another brake lever 186, which is mounted either to the handlebar assembly 150 or to the frame member 105. The brake lever 186 may be configured to actuate at least one of the front wheel brake 130 and the rear wheel brake 135.

[00038] Further, a seat assembly 155 is mounted to the frame member 105 and disposed rearward of the fuel tank 145. The rider can operate the vehicle 100 in a seated position on the seat assembly 155. Moreover, the vehicle 100 includes a pair of rider foot support structure 185 disposed on either side of the vehicle 100 for the user to rest feet. The rider foot support structure 185 extends in a lateral direction RH-LH of the vehicle 100 and is secured to the frame member 105 of the vehicle 100.

[00039] Further, the vehicle 100 includes a front fender 160 covering at least a portion of the front wheel 110 and a rear fender 165 covering at least a portion of the rear wheel 115. Also, the vehicle 100 is provided with plurality of panels 170,

171 mounted to the frame member 105 and covering the frame member 105 and/or parts of the vehicle 100. Further, the vehicle 100 includes a headlamp 175 and a tail lamp 180. Also, the vehicle 100 is employed with plurality of mechanical, electronic, and electromechanical system e.g. an anti-lock braking system, a vehicle safety system, or an electronic control system. The vehicle 100 is also employed with a braking system 190.

[00040] Fig. 2 illustrates a schematic view of a braking system 190 employed on a vehicle, in accordance with an embodiment of the present subject matter. Fig. 3 depicts an exploded view of the braking system 190, in accordance with an embodiment of the present subject matter. The braking system 190 is a synchronized braking system. The synchronized braking system 190 is considered to portray the challenges in the field of the present subject matter. However, the present subject matter is not limited to a synchronized braking system as it is applicable to conventional braking systems that operates only one-wheel brake.

[00041] The braking system 190 is supported on a first base member 210, which is a pivot bracket of the frame member 105. The first base member 210 supports a first pivot support member 205, which supports substantially the rotating members of the braking system 190. The first pivot support member 205 is secured to the first base member 210 and together they form a first support assembly 200. A second base member 211 is rotatably supported by the first pivot support member 205. The second base member 211 supports a second pivot support member 206, wherein the second base member 211 is capable of supporting a rotating member like the brake lever 186 through the second pivot support member 206. Thus, the second base member 211 and the second pivot support member 206 form a second support assembly 201. The second base member 211 may be considered as the rotating member with reference to the first support assembly 200. The terms 'brake lever' and 'rotating member' are interchangeably used.

[00042] In the present embodiment, the brake lever 186 is pivotable about a first-pivot axis F-F' (shown in Fig 3) and the second base member 211 is pivoted about a second pivot axis S-S'. In the depicted embodiment, the brake lever 186

includes an input arm 187 and an output arm 189. The input arm 187 includes a pedal foot-peg 188, through which user actuates the brake lever 186. The input arm 187 has a length substantially greater than the length of the output arm 189, wherein the input arm 187 enables of translation of the force exerted by the user
5 into enhanced force (torque) that would be acting on the second pivot support member 206. This enables actuation of the rear wheel brake 135 through a first actuating member 191. In one embodiment, first actuating member 191 is a connecting rod.

[00043] Further, the second base member 211, which is a movable pivot
10 member, is subjected to a pivot reaction force at the second pivot support member 206. The second pivot support member 206 being affixed to the second base member 211 exerts force on the second base member 211. As the second base member 211 is fixedly pivoted to the first pivot support member 205, the pivot reaction force acting on the second base member 211 enables pivotal movement
15 of the second base member 211. The pivotal movement of the second base member 211 causes pulling of a second actuating member 192, which causes actuation of the front wheel brake 130. Thus, the second pivot support member 206 receives higher force due to force applied by the user and the first pivot support member 206 is also subjected to higher forces as it supports the second
20 base member 211 and also receives the force exerted by the rotating member/ brake lever 186 thereat. The present subject matter provides a rigid and reliable support assembly 200, 201, which is capable of withstanding the forces acting thereon and at the same time offering ease of manufacturing. For brevity, the second supporting assembly 201 is discussed below, which would be applicable to
25 the first support assembly 200 as well.

[00044] Fig. 4 depicts a perspective view of a support assembly, in accordance with an embodiment of the present subject matter. Fig. 5 depicts an exploded view of a supporting assembly, in accordance with an embodiment of the present subject matter. The second support assembly 201 includes the second base
30 member 211 and the second pivot support member 206 affixed thereto. The base member 211 includes a body portion 251, which is a forged part or sheet metal

part made of any known rigid materials including any known metals. In the present embodiment, the base member 211 includes a second aperture portion 216 at which the second pivot support member 206 gets secured. The body portion 251 defines a boss portion 246 to enables mounting of the second base member 211 to the first pivot support member 205.

[00045] As shown in Fig. 5, the second support member 206 includes a supporting portion 221 and a securing portion 226. The supporting portion 221 of the second support member 206 is having a cylindrical profile to rotatably support the rotating member 186, which is the brake-pedal. The securing portion 226 at least partially passes through the second aperture portion 216 of the second base member 211. The second securing portion 226 includes at least a portion forming a first portion 231 (shown in Fig 6), which is configured to have a thickness greater than a thickness of the supporting portion 221 thereby forming a stepped support member profile.

[00046] Fig. 6 depicts a sectional view of the support assembly taken along axis X-X' as depicted in Fig. 4. Fig. 7 depicts a sectional view of a base member taken along axis Y-Y' as depicted in Fig. 5. The second aperture portion 216, as shown in Fig. 7, includes a first receiving portion 241 having a thickness/width, taken in radial direction, greater than rest of the second aperture portion 216 thereby forming a stepped aperture profile. The first receiving portion 241 is configured to accommodate the first portion 231 of the second support member 206. Thus, the second support member 206 is initially inserted into the second aperture portion 216 whereby the first portion 231 is accommodated at the first receiving portion 241, through the axis A-A' of the second aperture portion 216. The second support member 221 is inserted into the second aperture portion from a side opposite to the side the rotating member would be disposed.

[00047] The stepped support member profile enables the second support member 206 to be assembled in a desired position along the axis A-A', without the need any additional adjustment. Further, in one embodiment, on one side of the second support assembly 201 the second base member 211 is welded to the

second pivot support member 206. The second pivot support member 206 is be capable of withstanding any load exerted on the supporting portion 221 as the load is not directly transferred to the weld joint. The diameter/thickness/cross-sectional area of the first portion is kept to be greater than the diameter/thickness of the supporting portion 221, wherein the securing portion 226 is configured to offer improved structural strength and to enable improved load sharing between the base member and the pivot support member. Moreover, the first portion 231 offers an improved surface area for load sharing and load transfer between the parts. Further, the amount of excess material used for first portion 231 is effectively reduced from the second aperture portion 216 at the receiving portion 241 thereby offering substantially zero net material addition.

[00048] As shown in Fig. 6, the pivot support member 206 is disposed to have contact surface in two axial planes and in one radial plane thereby improving contact area between the pivot support member 206 and the base member 211.

The base member 211 also acts a rotating member as it is a moving pivot member.

[00049] Thus, as shown in Fig. 6, the second pivot support member 206 has a variable thickness D1, D2. At the supporting portion 221, the thickness of the supporting portion 221 is D1 and at the first portion 231 of the securing portion 226, the thickness of the pivot support member 206 is D2. The thickness D2 of the first portion 231 is greater than the thickness D1 of the supporting portion 221.

[00050] Fig. 8 depicts a perspective view of a support assembly, in accordance with another embodiment of the present subject matter. Fig. 9 depicts a sectional view of the support assembly 202 taken along axis Z-Z' of Fig. 8. Also, Fig. 9 depicts a schematic sectional view of the brake-pedal/ rotating member 186. The support assembly 202 includes a third pivot support member 207 and a base member 212. The third pivot support member includes a third support member 207 having a supporting portion 222 and a securing portion 226. The supporting portion 222 of the second support member 207 is having a cylindrical profile to rotatably support the rotating member 186, which is the brake-pedal. In the present embodiment, the securing portion 227 is completely accommodated at a third aperture portion 217 of the second base member 212. The third securing

portion 227 includes at least a portion forming a first portion 232, which is configured to have a thickness greater than a thickness of the supporting portion 221 thereby forming a stepped support member profile. In the present embodiment, the first portion 232 completely coincides with the securing portion
5 227 of the third pivot support member 207.

[00051] Fig. 9 depicts a sectional view of the support assembly 202 and a detailed view of the weld portion between the base member and the pivot support member. The third aperture portion 217, as shown in Fig. 9, includes a first receiving portion 242 having an aperture portion which is adapted to receive the
10 first portion 232. The first receiving portion 242 is configured to accommodate the first portion 232 of the third support member 207. Thus, in the present embodiment, the third support member 207 is initially inserted into the third aperture portion 217 and subsequently on one side both the members 207, 212 are welded together. Further, as shown in detailed view of Fig. 9, the weld portion
15 260 is shown. One of the base member 212 and the pivot support member 207 is provided with a chamfered end that enables deep penetration of weld thereby providing rigid support assembly 202.

[00052] Further, the diameter/thickness of the first portion 232 is kept to be greater than a diameter/thickness of the supporting portion 222, wherein the
20 securing portion 227 is configured to offer improved structural strength and to enable improved load sharing between the base member and the pivot support member. Also, the securing portion 227 offers greater surface area disposed to be in contact with the base member 212 thereby offering optimum load sharing and eliminating any bending of the pivot support member for a reasonable number of
25 operational cycles when compared to a conventional design.

[00053] Further, the third pivot support member 207 includes a protruded portion 233 of the first portion 232 that is protruded at least partially outward from the third aperture portion 217, whereby the protruded portion 233 enables in retaining a pre-determined distance between a boss portion 184 of the rotating
30 member 186 & the base member 212. This enables the forces acting on the pivot

support member 207 from transferring to the base member through an outer surface (contact). This enables in maintaining a balance between an active force acting on the pivot support member 207 and a reactive force from brake lever 186, to the pivot support member 207 only. This offers a force balance to the pivot
5 support member 207 and at the same it enables effective functioning of the synchronous braking system that uses pivot reaction force.

[00054] Thus, the braking system of the present subject matter uses a method of actuating a braking system 190. The comprising the steps of receiving a braking force from a user by the rotating member 186. The rotating member being
10 supported on one of a first support assembly 200 and a second support assembly 201 depending on the braking system application. Then, transferring force from the rotating member 186 to one of the first actuation member 191, that can actuate a rear wheel brake 130, and the second support assembly 201, 202, that can enable actuation of at least one of a front wheel brake 131 and a rear wheel break 135.
15 Providing the pivot support member 205, 206, 207 of the support assembly 200, 201, 202, which is configured to rotatably support the at least one rotating member 186, 211. The pivot support member 205, 206, 207 being provide with a variable thickness D1, D2, and the pivot support member 205, 206, 207 is having a thickness at adjoining portion of the base member 210, 211, 212 of the support
20 assembly 200, 201, 202 being greater.

[00055] The terms ‘first base member’, ‘second base member’, and ‘third base member’ are used to differentiate between various base members, wherein the term ‘base member’ may be interchangeably used to refer to the same members. The terms ‘first pivot support member’, ‘second pivot support member’, and
25 ‘third pivot support member’ are used to differentiate between various pivot support members, wherein the term ‘pivot support member’ may be interchangeably used to refer to the same members. The terms ‘thickness’ and ‘diameter’ are interchangeably used herein.

[00056] It is to be understood that the aspects of the embodiments are not necessarily limited to the features described herein. Many modifications and variations of the present subject matter are possible in the light of above disclosure. Therefore, within the scope of claims of the present subject matter, the
5 present disclosure may be practiced other than as specifically described.

List of reference signs:

100	vehicle	186	rotating member/ brake-lever
105	frame member	187	input arm
106	head tube	188	pedal foot-peg
5 107	main tube	189	output arm
108	secondary base member/ pivot bracket	190	braking system
110	front wheel	191	first actuating member
115	rear wheel	192	second actuating member
10 120	front suspension system	200/201/202	support assembly
125	rear suspension system	205/206/207	pivot support member
130	front wheel brake	210/211/212	base member
135	rear wheel brake	216/217	aperture portion
140	power unit	221/222	supporting portion
15 145	fuel tank	226/227	securing portion
150	handle bar assembly	231/232	first portion
151	independent brake lever	233	protruded portion
155	seat assembly	241/242	receiving portion
160	front fender	246/247	boss portion
20 165	rear fender	251/252	body portion
170/171	panels	260	weld portion
175	head lamp	A-A'	aperture axis
180	tail lamp	D1/D2	thickness/diameter
184	boss portion	F-F'	first-pivot axis
25 185	foot support structure	S-S'	second-pivot axis

We claim:

1. A support assembly (200, 201, 202) of a brake system for a motor vehicle (100), said support assembly (200, 201, 202) capable of rotatably supporting at least one rotating member (186, 211), said support assembly (200) comprising:

5 a base member (210, 211, 212), said base member (210, 211, 212) includes at least one aperture portion (217, 216) disposed along an aperture axis (A-A'); and

at least one pivot support member (205, 206, 207), said at least one pivot support member (205, 206, 207) capable of being secured at a
10 corresponding at least one aperture portion (216, 217),

said at least one pivot support member (205, 206, 207) configured to rotatably support said at least one rotating member (186, 211), said at least one pivot support member (205, 206, 207) accommodated in said base member (210, 211, 212) is having a variable thickness (D1, D2) with
15 a thickness of said at least one pivot support (205, 206, 207) adjoining said base member (210, 211, 212) being greater.

2. The support assembly (200, 201, 202) as claimed in claim 1, wherein said at least one pivot support member (205, 206, 207) includes a supporting portion (221, 222), and a securing portion (226, 227), said supporting portion (221, 222)
20 capable of rotatably supporting said at least one rotating member (186, 211), said securing portion (226, 227) at least partially accommodated at said at least one aperture portion (216, 217) of said base member (210, 211, 212), and said securing portion (226, 227) includes at least a portion forming a first portion (231, 232), and said first portion (231, 232) is configured to have a thickness greater
25 than a thickness of said supporting portion (221, 222).

3. The support assembly (200, 201, 202) as claimed in claim 2, wherein said at least one aperture portion (216, 217) is provided with a receiving portion (241,

242), said receiving portion (241, 242) having a first diameter configured to accommodate said first portion (231, 232) throat and said at least one aperture portion (216, 217) includes a second diameter lesser than said first diameter to accommodate rest of a portion of said securing portion (226, 227) excluding said
5 first portion (231, 232).

4. The support assembly (201, 202) as claimed in claim 2, wherein said first portion (231, 232) is having at least one of a cross-sectional area and a diameter (D2) greater than a corresponding at least one of a cross-sectional area and a diameter (D1) of said supporting portion (221, 222).

10 5. The support assembly (202) as claimed in claim 1, wherein said pivot support member (207) includes a protruded portion (233) at least partially protruding outward from the aperture portion (217) whereby the protruded portion (233) provides a pre-determined distance between a boss portion (184) of said rotating member (186) and said base member (212).

15 6. The support assembly (202) as claimed in claim 2, wherein said first portion (232) substantially coincides with said securing portion (227) of said pivot support member (207).

7. The support assembly (202) as claimed in claim 1, wherein said pivot support member (207) is secured to said base member (212) by welding, wherein
20 one of the base member (212) and the pivot support member (207) is provided with a chamfered portion (261) enabling deep penetration of a weld portion (260) formed by said welding.

8. The support assembly (201, 202) as claimed in claim 1, wherein said base member (211, 212) is a moving pivot member of a braking system (190), and said
25 base member (211, 212) is secured to a frame member (105) of said motor vehicle (100).

9. The support assembly (200) as claimed in claim 1, wherein said base member (210) is a pivot bracket of a frame member (105) of said motor vehicle (100).

30 10. A method of actuating a braking system (190), said method comprising the steps of:

receiving a braking force from a user by a rotating member (186), said rotating member being supported on one of a first support assembly (200) and a second support assembly (201);

transferring force from the rotating member (186) to one of a first actuation member (191), to actuate a rear wheel brake (130), and said second support assembly (201, 202), to actuate at least one of a front wheel brake (131) and a rear wheel break (135); and

providing a pivot support member (205, 206, 207) of said support assembly (200, 201), configured to rotatably support said at least one rotating member (186, 211), with a variable thickness (D1, D2), and said pivot support member (205, 206, 207) is having a thickness at adjoining portion of a base member (210, 211, 212) of said support assembly (200, 201, 202) being greater.

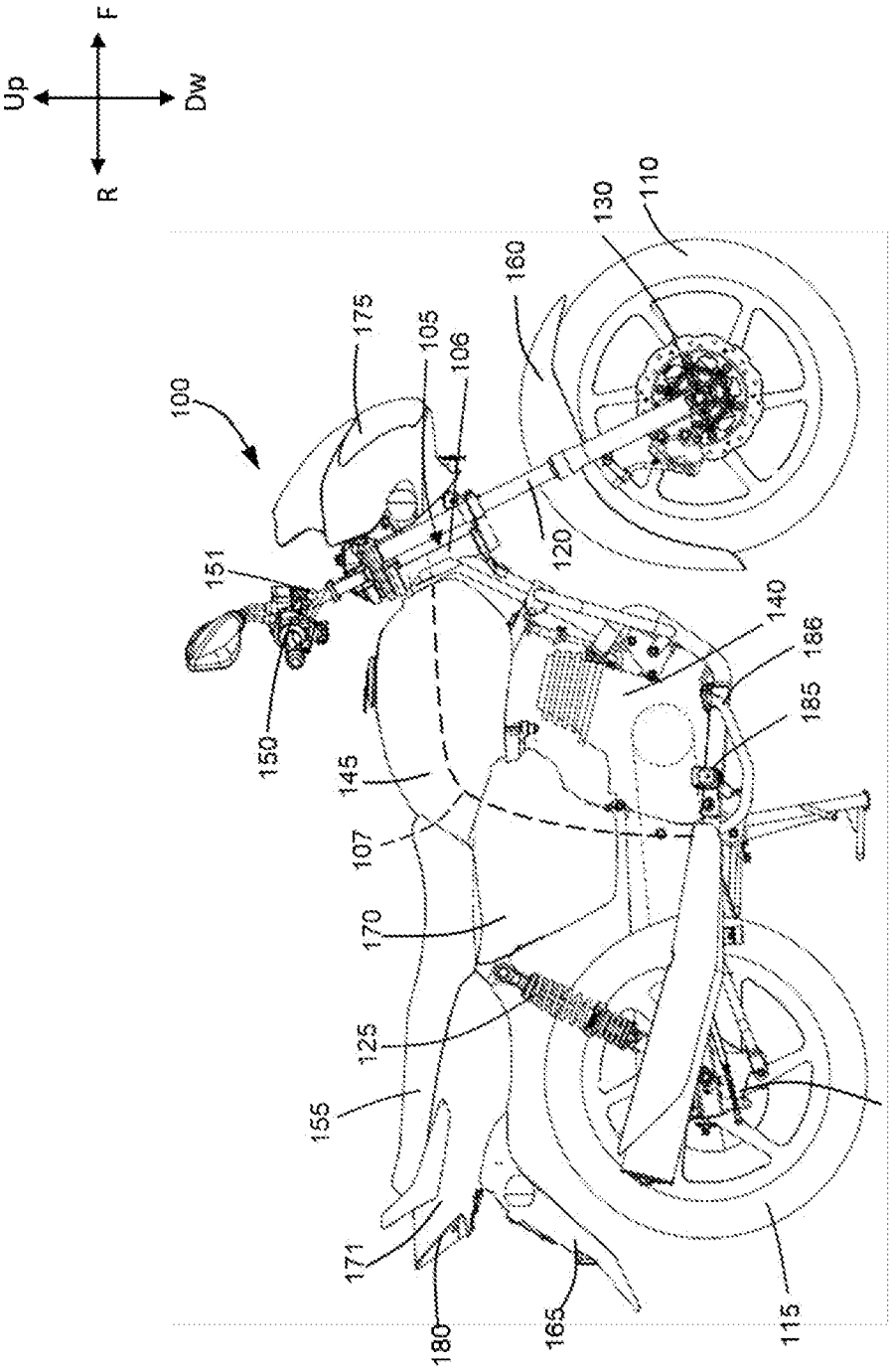


Fig. 1

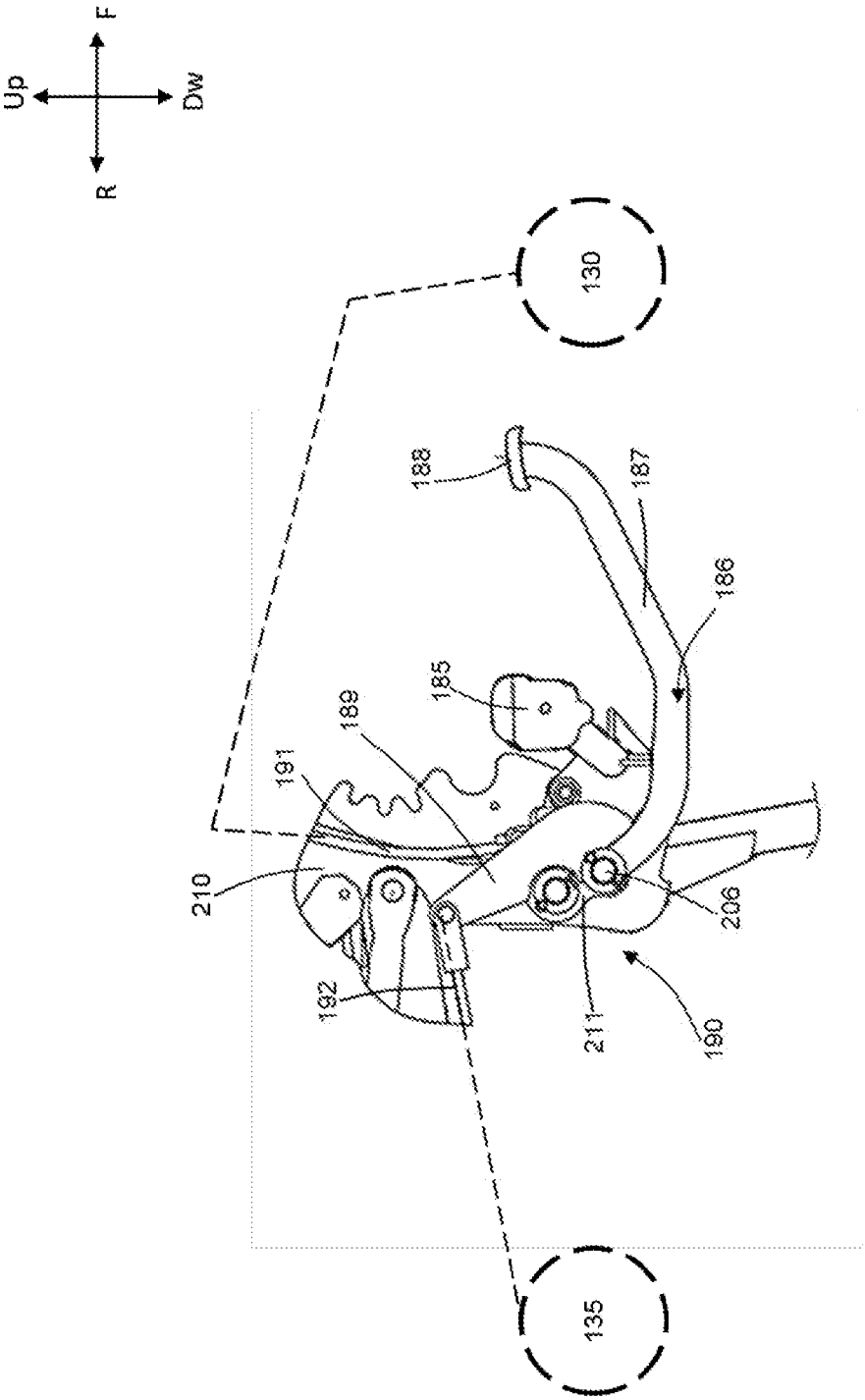


Fig. 2

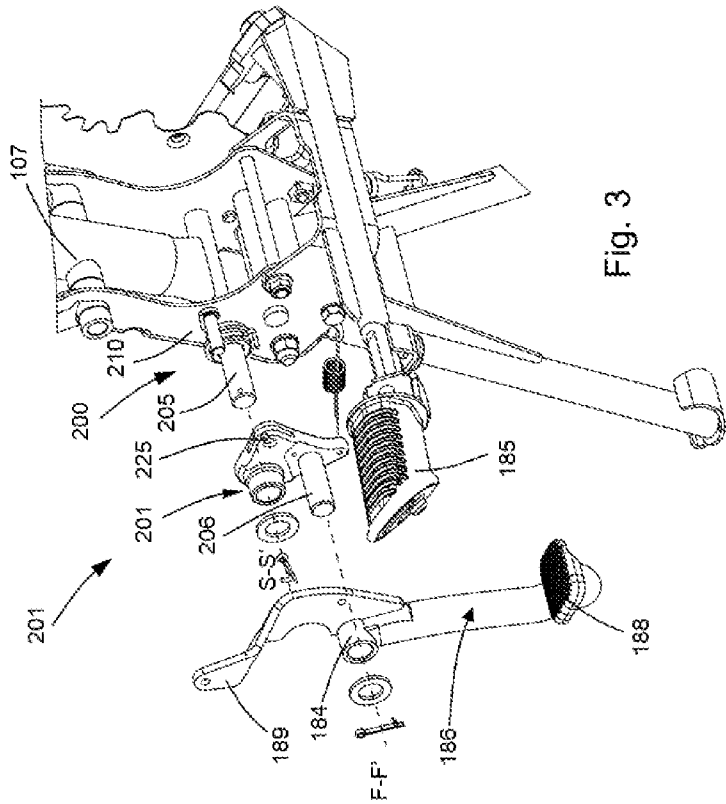
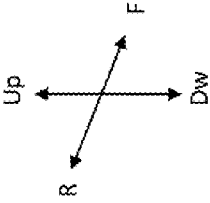


Fig. 3

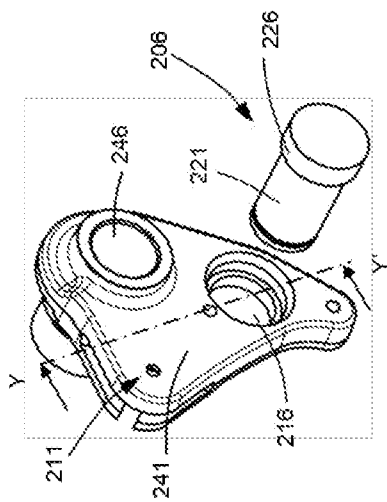


Fig. 5

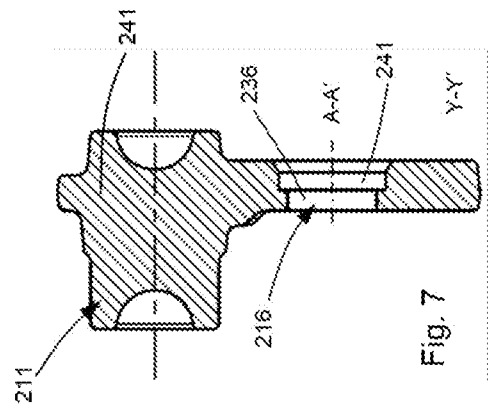


Fig. 7

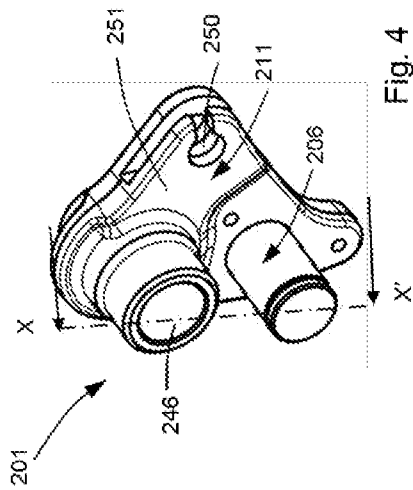


Fig. 4

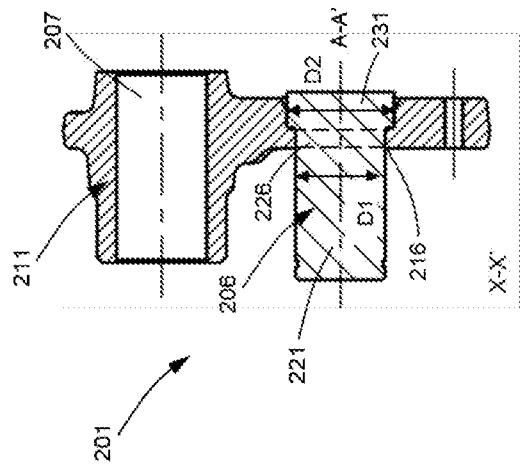


Fig. 6

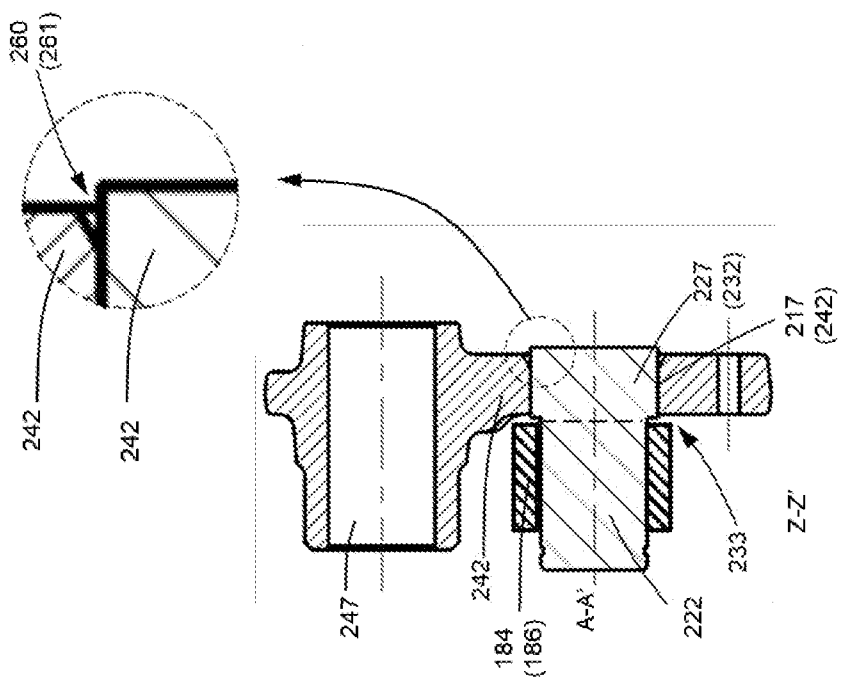


Fig. 9

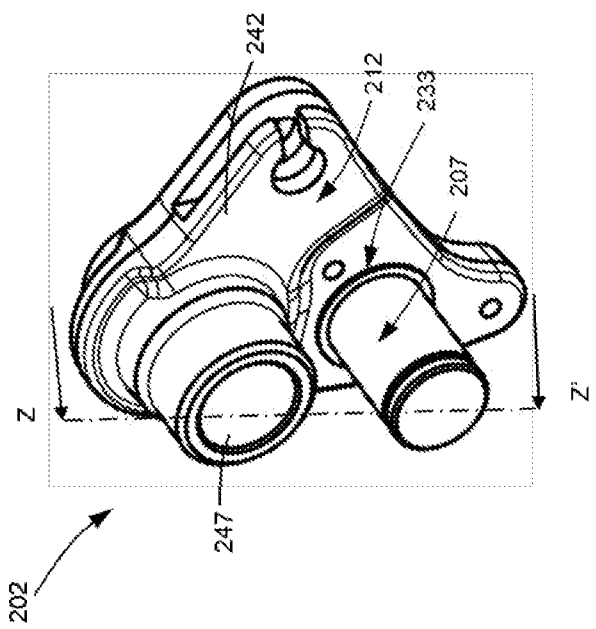


Fig. 8

INTERNATIONAL SEARCH REPORT

International application No.
PCT/IN2020/050300

A. CLASSIFICATION OF SUBJECT MATTER

F16D51/22, B62K3/04, B62K23/08 Version=2020.01

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)

F16D51/22

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)

TotalPatent One, IPO Internal Database

Keywords: Brake padel, pin, support, pivot, clearance fit, rotat*.

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 2028583 A (BENDIX BRAKE CO (US)) 21 January 1936 (21.01.1936) Claims 1, 3 & 4 & NO FAMILY	1-7, 10
Y	US 1919882 A (EVANS EDWIN R (US)) 25 July 1933 (25.07.1933) Page 2, lines 95-107, page 3, lines 78-85 & NO FAMILY	1-7, 10
A	Page 2, lines 22-40	8-9
Y	US 20140374198 A1 (TOYOTA MOTOR CO LTD & CO (JP)) 25 December 2014 (25.12.2014) Para. 0054, para. 0101, para. 0112	2-6



Further documents are listed in the continuation of Box C.



See patent family annex.

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"D" document cited by the applicant in the international application

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"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

"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

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search

26-08-2020

Date of mailing of the international search report

26-08-2020

Name and mailing address of the ISA/

Indian Patent Office

Plot No.32, Sector 14, Dwarka, New Delhi-110075

Facsimile No.

Authorized officer

Atul Raj

Telephone No. +91-1125300200

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/IN2020/050300

Citation	Pub.Date	Family	Pub.Date
US 20140374198 A1	25-12-2014	BR 112014013338 A2	13-06-2017
		CN 103958915 A	30-07-2014
		EP 2787239 A1	08-10-2014
		JP 5637318 B2	10-12-2014
		RU 2564270 C1	27-09-2015
		WO 2013080382 A1	06-06-2013