



FORMULARIO ÚNICO DE SOLICITUD DE PATENTE
PCT

ENTRADA EN FASE NACIONAL

10 Ene. 2008

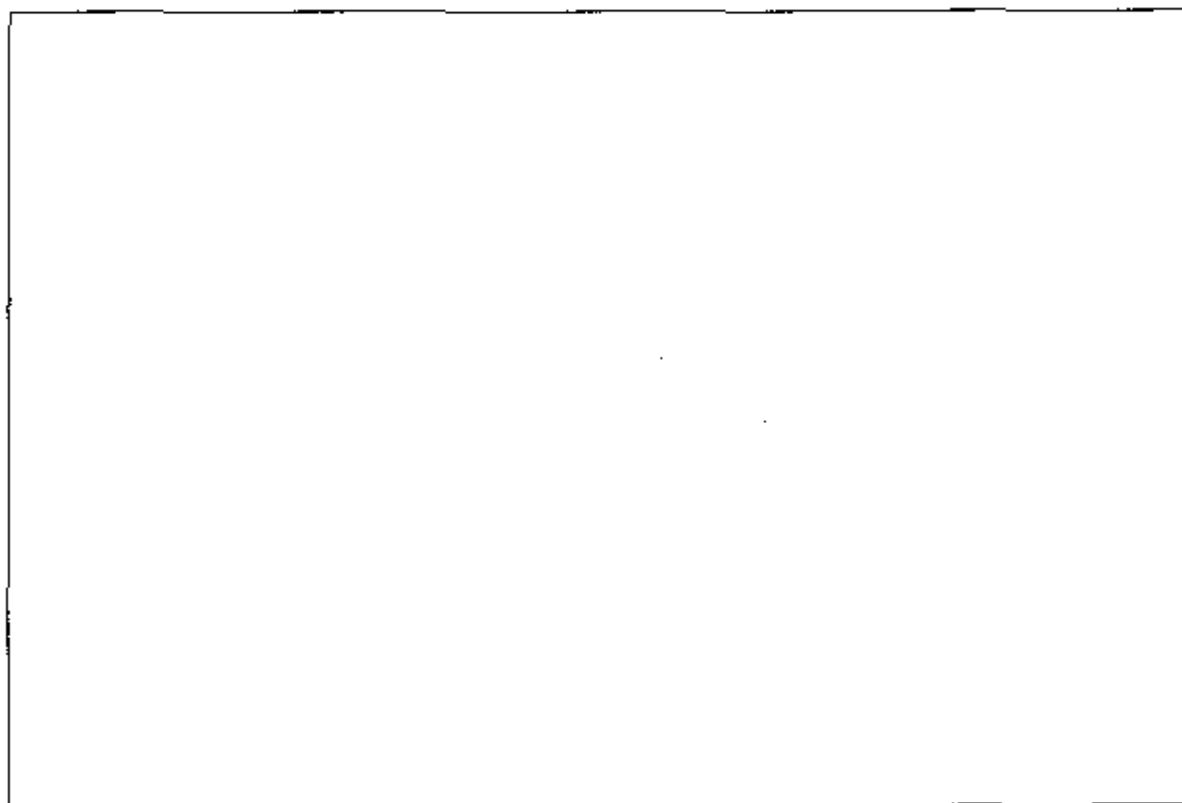
1) SOLICITUD DE:			
☒ Patente de invención		☐ Patente de Modelo de Utilidad	
☐ Capítulo I.		☒ Capítulo II.	
2) SOLICITANTE (71)	Nombre: BAJAJ AUTO LIMITED		IDENTIFICACIÓN C.C. ☐ NIT: ☒ C.E. ☐ OTRO ☐ Cual _____ NÚMERO _____
	Dirección: Akurdi, Pune 411 035, India Nacionalidad o domicilio: Pune, India Lugar de constitución: India		
	Teléfono: _____ Fax: _____ E. Mail: _____		
3) REPRESENTANTE O APODERADO	Nombre: DILIA MARÍA RODRÍGUEZ D'ALEMAN		IDENTIFICACIÓN C.C. ☒ NIT: ☐ C.E. ☐ OTRO ☐ NÚMERO: 41.654.882 TP: 20824 CSJ
	Dirección: Carrera 11 N°. 86-53 Piso 6 Bogotá D.C. Teléfono: 6181088 Fax: 6350824 E. Mail: info@clarkemodet.com.co		
4) INVENTOR (ES) (72)	Nombre: ABRAHAM, Joseph Dirección: Bajaj Auto Limited, Akurdi, Pune 411 035, Maharashtra, India Nacionalidad o Domicilio: Pune, Maharashtra, India		
5) PCT (86) Solicitud Internacional No. PCT/IN2006/000201 Fecha: Junio 9, 2006 Publicación Internacional No. WO 2007/023506 A2 Fecha: Marzo 1, 2007			
6) Título (54) AMORTIGUADOR PARA VEHICULO MOTORIZADO			
7) Clasificación Internacional:			
8) PRIORIDAD	33) País de Origen	(32) Fecha	(31) Número de Solicitud
SI ☒ NO ☐	INDIA	JUNIO 10, 2005	695/MUM/2005
9) Comprobante de pago N°.			
Instrucciones para el diligenciamiento del presente formulario. Ver reverso de esta pagina			

10)

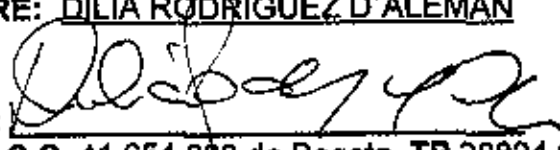
ANEXOS

- ☒ Comprobante de pago de la tasa de presentación de la solicitud
- ☐ Comprobante de pago por reivindicación de prioridad
- ☐ Documento que acredite la existencia y representación legal cuando el solicitante sea persona Jurídica
- ☐ Poderes, si fuera el caso
- ☐ Documento de cesión del inventor al solicitante o a su causante
- ☐ Declaraciones
- ☒ Copia de la solicitud Internacional. (Resumen, descripción, reivindicación, Dibujos).
- ☒ Traducción de la solicitud internacional al castellano. (Resumen, descripción, reivindicación, Dibujos)
- ☒ Copia del examen preliminar efectuado por la IPEA
- ☐ De ser el caso, copia del contrato de acceso
- ☐ De ser el caso, documento que acredite la licencia o autorización de uso de conocimientos tradicionales de las comunidades indígenas
- ☐ De ser el caso, certificado de depósito del material biológico
- ☐ Arte final 12 x 12 y 6 x 6 cm
- ☐ De ser el caso, información sobre otras solicitudes de patente o títulos obtenidos en el extranjero por el mismo titular o su causante, relacionados parcial o totalmente con la invención de esta solicitud.
- ☒ Otros:
1. Reporte internacional de búsqueda
 2. IPEA/416,
 3. Request, IB/304
 4. Opinión escrita
 5. Declaraciones

11) FIGURA CARACTERÍSTICA:



12) Solicitud concesión de la patente,

NOMBRE: DILIA RODRÍGUEZ D'ALEMANFIRMA: 

C.C. 41.654.882 de Bogotá TP 20824 CSJ

Instrucciones para el diligenciamiento del presente formulario. Ver reverso de esta página

SUPERINTENDENCIA DE INDUSTRIA Y COMERCIO



No. 07-130353-00000-0000

Fecha: 2007-12-10 16:06:06 Dep. 2020 REGISTRACION
Tra 11 PATENTE (Y) Lva 379 PASL NACIONAL
Act 411 PRESENTACION Folios: 88

SUPERINTENDENCIA DE INDUSTRIA Y COMERCIO

KIT 1 800176089-2

RECIBO OFICIAL DE CAJA : 07 - 98,457
FECHA : DICIEMBRE 3 DE 2007

===== CONSIGNACION =====

DEPOSITANTE	TIPO PAGO	BANCO	CUENTA	No. PAGO	FECHA PGO	Vr. PAGO
CLARKE ROSET Y CG. COLOMBIA	CONSIGNACION	BANCO POPULAR	650-99110-3	64177535	03/12/2007	22,600,000.00

===== CONCEPTO =====

CANT.	RENTISTICO	CONCEPTO	TOTAL CONCEPTO
1	50005-01-01 SOLICITUDES	1 TRAMITES DE SOL. DE PATENTE DE IN	482,000.00
		TOTAL :	\$ 482,000.00

SON: CUATROCIENTOS OCHENTA Y DOS MIL PESOS

RESPONSABLE : _____

RECIBO DE CAJA APLICADO AL EXPEDIENTE No. _____

(19) World Intellectual Property Organization
International Bureau



(43) International Publication Date
1 March 2007 (01.03.2007)

PCT

(10) International Publication Number
WO 2007/023506 A2

(51) International Patent Classification: Not classified

(21) International Application Number:
PCT/IN2006/000201

(22) International Filing Date: 9 June 2006 (09.06.2006)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
695/MUM/2005 10 June 2005 (10.06.2005) IN

(71) Applicant (for all designated States except US): BAJAJ
AUTO LIMITED [IN/IN]; Akurdi, Pune 411 035 (IN).

(72) Inventor; and

(75) Inventor/Applicant (for US only): ABRAHAM, Joseph
[IN/IN]; Bajaj Auto Limited, Akurdi, Pune 411 035, Ma-
harashtra (IN).

(74) Agents: MADAN, Jose, A. et al.; Khaitan & Co, Advo-
cates, Notaries, Patent & Trade Mark Attorneys, Meher
Chambers, 4th & 5th Floor, R K Marg, Ballard Estate,
Mumbai 400 038, Maharashtra (IN).

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

AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN,
CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI,
GB, GD, GE, GH, GM, GR, GU, HK, IL, IN, IS, JP, KE,
KG, KM, KN, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV,
LY, MA, MD, MG, MK, MN, MW, MX, MY, NA, NG, NI,
NO, NZ, OM, PG, PH, PL, PT, RO, RS, RU, SC, SD, SE,
SG, SK, SL, SM, SY, TJ, TM, TN, TR, TT, TZ, UA, UG,
US, UZ, VC, VN, ZA, ZM, ZW.

(84) Designated States (unless otherwise indicated, for every
kind of regional protection available): ARIPO (BW, GH,
GM, KE, LS, MW, MZ, NA, SD, SI, SZ, TZ, UG, ZM,
ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM),
European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI,
FR, GB, GR, HU, IE, IS, IT, LT, LU, LV, MC, NL, PL, PT,
RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA,
GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Declarations under Rule 4.17:

- as to applicant's entitlement to apply for and be granted a
patent (Rule 4.17(ii))
- of inventorship (Rule 4.17(iv))

Published:

- without international search report and to be republished
upon receipt of that report

For two-letter codes and other abbreviations, refer to the "Guid-
ance Notes on Codes and Abbreviations" appearing at the begin-
ning of each regular issue of the PCT Gazette.

(54) Title: A SHOCK ABSORBER FOR A MOTOR VEHICLE

(57) Abstract: A shock absorber (1, 201) comprising a spring combination (17, 18) having first and second spring elements (17, 18) having capacity to store energy from vehicle vibrations, said first and second spring elements (17, 18) being operatively disposed to share load due to road induced vibrations and resultant shear stresses from compression and expansion of the spring elements during motion of the vehicle (100) are within allowable limits. Spring elements (17, 18) may be disposed over a hydraulic cylinder (4) forming a further element of the shock absorber. Such a shock absorber (1, 201) has cost, comfort and reliability advantages when applied to vehicles such as motorcycles.

WO 2007/023506 A2

A SHOCK ABSORBER FOR A MOTOR VEHICLE

5 This invention relates to shock absorbers for motor vehicles as well as motor vehicles utilising such shock absorbers.

Shock absorbers are used in motor vehicles to absorb or dampen road induced vibrations caused by uneven road surfaces, thus providing comfort and safety to driver and passenger or rider in the case
10 of a motorcycle or motor scooter. Shock absorbers also bear vehicle loads.

A typical shock absorber comprises a hydraulic cylinder operatively disposed with respect to a helical compression spring pre-compressed to a predetermined load value and disposed over the hydraulic cylinder. The spring may be disposed over the hydraulic cylinder between the lower spring
15 seat and upper spring seat of the shock absorber. Sometimes the hydraulic cylinder itself is referred to as the "shock absorber" since it is the cylinder and fluid contained within it that absorbs energy arising from the vibration of the vehicle.

The spring is compressed to a predetermined load value having regard to parameters such as the
20 vehicle weight and load acting on the vehicle as well as the desired shock absorption capacity of the shock absorber. During motion of the vehicle, the spring is subjected to frequent compression and expansion due to road induced vibrations. This creates shear stresses in the spring, leads to spring fatigue and may cause premature spring failure thereby reducing the life of the shock absorber. Spring failure during motion of the vehicle may also lead to serious accidents.

25 The capacity of the shock absorbers to absorb or dampen road induced vibrations and bear vehicle load depends on various factors including the spring diameter, spring length and spring characteristics. This is also necessary for rider comfort. Reduction in length of a spring leads to a reduction in the number of turns for a given spring wire diameter and mean coil diameter and given
30 spring stroke and, consequently, harder suspension and reduced rider comfort. The overall length of the shock absorber depends on the pre-compressed length of the spring. Minor length adjustment of the spring, may be possible by adjusting the position of the lower spring seat. However, in the usual case where the shock absorber is located close to the motorcycle body the chain case on one side and muffler or silencer on the other side of the vehicle are generally required to have depressions to provide
35 sufficient clearance for proper location of the lower spring seat of the shock absorbers. Fabrication of such depressions creates additional manufacturing costs as additional manufacturing is required.

Further, the consequential limitation in the orientation of the silencer, increased irritating noise due to motorcycle chain wearing against the depression in the chain case and reduced aesthetics of the vehicle are problems with such arrangements.

An alternative to such arrangements is mounting of a shock absorber away from the vehicle body. Such an arrangement requires additional reinforcement which adds to the cost of a vehicle.

It is therefore an object of the invention to provide a shock absorber which has improved reliability and life.

Another object of the invention is to provide a shock absorber comprising pre compressed springs of reduced length.

Another object of the invention is to provide a shock absorber which allows increased ride comfort; optimally with an arrangement which may be conveniently mounted on the motorcycle without cost inducing additional fabrication operations.

With these objects in view, the present invention provides a shock absorber comprising a spring combination having first and second spring elements having capacity to store energy from vehicle vibrations, said first and second spring elements being operatively disposed to share the load due to road induced vibrations. In this way, the resultant shear stresses resulting from compression and expansion of the spring elements during motion of the vehicle are within and may be well below, permissible limits. Operative disposition of the springs may involve binding together of the springs.

Each spring element, there may be more than two, may have differing spring rate, spring rate of springs within the combination being selected to achieve the desired degree of rider comfort. The spring elements may be dual or plural rate springs. The spring rates may be selected such that stiffness of the spring combination is the same as for a single spring, yet with a shorter spring length than for a comparable single spring arrangement. Furthermore, the reduced spring length allows a greater clearance from a chain case of a motorcycle and enables fabrication of depressions, and consequent wear and noise to be reduced or avoided.

Such a shock absorber may comprise a hydraulic cylinder or damper body, with the spring combination taking the form of a pair of helical springs pre-compressed to a predetermined load value. The springs may include an inner spring disposed over the hydraulic cylinder and an outer spring disposed over the inner spring. Each end of each spring is located in a spring seat. The pre

compression of both springs may be adjusted by adjusting position of a spring seat, preferably the lower spring seat for the spring.

One end of the outer spring, for example the lower end, may be located on an outer locator, this being – in the preferred case – located on the lower spring seat. Similarly, one end of the inner spring – again conveniently the lower end – is located against an inner locator located on the lower spring seat.

The shock absorber may comprise a spacer provided between the springs for preventing friction and wear through relative motion of the springs. This spacer may be located in one of the spring seats, for example the upper spring seat. The shock absorber is applicable to any vehicle but is particularly well suited for two wheel vehicles such as motorcycles and motor scooters or three wheel vehicles. The shock absorber may be conveniently included within a rear wheel suspension of such a vehicle.

The characteristics of the springs making up the spring combination of the shock absorber may be selected with the object of reducing vehicle manufacturing cost. As assembled spring length is less for given rider comfort and acceptable maximum shear stress, more space may be made available for routing of a motorcycle silencer. Clearances between chain case and shock absorber may also allow fabrication operations to be simplified since it is no longer necessary to manufacture other components of the motorcycle to accommodate the shock absorber, for example through fabrication of depressions in the chain case and so forth.

The shock absorber of the invention may be more fully understood from the following description of preferred embodiments thereof described with reference to the accompanying drawings in which:

Figure 1 is a side cross-sectional view of a shock absorber in accordance with one embodiment of the present invention;

Figure 2 is a side cross-sectional view of a shock absorber in accordance with a second embodiment of the present invention;

Figures 3a to 3d provide wheel deflection to load characteristics of four types (z1) to (z4) of rear wheel suspension,

viz: (z1) shock absorber with a conventional single spring having stiffness 1.91 kg/mm;

(z2) shock absorber incorporating the present invention with its spring combination configured for the same rider comfort and load capacity as (z1);

(z3) shock absorber with a conventional single spring with lower stiffness of 1.48 kg/mm (a so-called "comfort" setting); and

(z4) shock absorber incorporating the present invention with its spring combination configured for the same rider comfort and load capacity as (z3).

Figures 4a and 4b indicate spring rate curves for the single spring of shock absorber (z1) and the single spring of shock absorber (z3);

Figures 5a to 5c indicate spring rate curves for the outer and inner spring elements and spring combination of the shock absorber (z2) of the invention and for which the wheel deflection to load characteristic is shown in Figure 3b;

Figures 6a to 6c indicate spring rate curves for the outer and inner spring elements and spring combination of the shock absorber (z4) of the invention and for which the wheel deflection to load characteristic is shown in Figure 3d; and

Figure 7 is a view of a motorcycle incorporating a shock absorber in accordance with one embodiment of the present invention.

Figure 8 is a view of a motorcycle with a conventional single spring shock absorber.

Referring now to Figures 1 and 7, there is shown the location and design of a shock absorber 1 utilised as part of the rear wheel suspension of a motorcycle 100. The shock absorber 1 for rear wheel 102 comprises a damper body 2 comprising a hydraulic cylinder 4 which absorbs vibrations caused by driving motorcycle 100 along an uneven road. Hydraulic cylinder 4 includes a piston 8 and piston rod 9 which moves through the cylinder 4 in accordance with the motion of motorcycle 100 along the road. Piston rod 9 is locked into position by lock nut 14. The hydraulic fluid is an oil of desired density and viscosity for the suspension application and the working portion 4a of the cylinder 4 is sealed by oil seal washer 10. Dust cover 13 also seals cylinder 4 against ingress of dust or dirt. The shock absorber 1 also includes a spring combination comprising a pair of springs 17 and 18. Springs 17 and 18 are helical compression springs pre-stressed to a predetermined load value having regard to parameters such as vehicle weight and load on the vehicle and desired shock absorption capacity of the shock absorber 1.

The spring elements are springs. Spring 17 is an inner spring disposed over hydraulic cylinder 4. Spring 18 is an outer spring disposed over hydraulic cylinder 4 and inner spring 17. Springs 17 and 18

are operatively disposed relative to each other and bind, during use, to share load acting on motorcycle 100 during its travel along the road.

Outer spring 18 is located against an outer locator 19 located on lower spring seat 5. Inner spring 17 is located against inner locator 20 also located on the lower spring seat 5. Shock absorber 1 is mounted to the vehicle body (not shown) by fastening means secured through upper and lower eyelets 15 and 16.

Hydraulic cylinder 4 is provided with an adjustable lower spring seat 5 which accommodates the lower ends 17a and 18a of springs 17 and 18. Lower spring seat 5 is provided with a number of cam profiles 6 located at different heights enabling different settings for the lower spring seat 5. In this way, pre-compression may be adjusted to achieve a desired level of rider comfort. Hydraulic cylinder 4 is also provided with a pair of lugs, one lug 7 of which is shown in Figure 1.

Adjustment of the height of the lower spring seat 5, spring - precompression and desired rider comfort, is achieved by rotating or turning the lower spring seat 5 on the hydraulic cylinder 4 which forms part of an adjustment means for spring stiffness of the springs 17 and 18. Lower spring seat 5 slides up or down on the hydraulic cylinder 4 against the lugs 7 and engages with a cam profile 6 to raise or lower the height of the lower spring seat 5 on the hydraulic cylinder 4 as required.

The upper ends of the springs 17 and 18 are seated in upper spring seat 11 which is fitted to the piston rod 9. A compression bump stop 12 fitted to piston rod 9, it absorbs shock from any jerky movement of the piston 8.

The shock absorber 201 of Figure 2 differs from the shock absorber 1 of Figure 1 in that a spacer 21 is provided between the springs 17 and 18. Spacer 21 is located in the upper spring seat 211 of the shock absorber 201. Spacer 21 prevents contact and wear by rubbing action of springs 17 and 18 against each other. Spacer 21 is therefore ideally made of a low friction polymer such as nylon or polypropylene. A spacer may also be provided between the hydraulic cylinder 4 and the inner spring 17 to prevent contact and wear by rubbing action of spring against the hydraulic cylinder.

During running condition of a vehicle fitted with the shock absorber 1 or 201 of the invention, both the inner and outer springs 17 and 18 bear the vehicle load and are subjected to frequent compression and expansion due to road induced vibrations. The load due to road induced vibrations and resultant shear stresses resulting from the compression and expansion of springs 17 and 18 during motion of motorcycle 100 are shared by the springs. Therefore, spring fatigue and chances of premature spring failure are reduced. Even if one of springs 17 and 18 fails during motion of the

vehicle, the shock absorber 1 or 201 can still function with one spring, at least for some time. The risk of both springs 17 and 18 failing simultaneously are very low to negligible, as the springs 17 and 18 are selected for expected running conditions. Therefore, the life and reliability of shock absorber 1, 201 is improved.

The degree of sharing of shear stresses and vehicle load may be achieved by appropriate selection of parameters like spring diameter and length and spring characteristics. At the same time, the effective length of the pre-compressed springs may be reduced without reducing the characteristics of the shock absorber 1, 201 and riding comfort.

Referring now to Figures 3 to 6, the characteristics and advantages of shock absorber 1, 201 of the invention may be demonstrated comparatively with single spring shock absorbers of the prior art. Figure 3a to 3d provide wheel deflection to load characteristics ("wheel rates") as described above. The wheel rates overlap for both single and dual spring shock absorbers set at the same stiffness value.

Figures 4a and 4b show the spring rate curves for springs set at initial stiffness 1.91 kg/mm (z1) and 1.48 kg/mm (z3), the "comfort" setting for a single rider condition on a two wheel vehicle.

The design characteristics of springs 17 and 18, according to the invention, set at the two stiffness values 1.48kg/mm and 1.91 kg/mm, as well as for a single spring shock absorber are reported in Table 1 below:

Table 1							
		Spring Combination (z2)		Spring Combination (comfort) (z4)		Single spring (z1)	Single spring (Comfort) (z3)
		Outer	Inner	Outer	Inner		
A	Wire diameter (mm)	6.5	5	6.5	5	7.5	7.5
B	Mean coil diameter (mm)	55	36.5	55	36.5	48	48
C	Active coils	10.75	15.25	14	19	15.5	20
D	Total Coils	12.25	16.25	15.5	20.5	17	21.5
E	Preload(mm)	8.5	12	14	7	10	12
	Material	As per IS4454-GR-3					

5 Figures 5a to 5c respectively show the spring rate curves for outer spring 18 (Fig 5a) and inner spring 17 (Fig 5b), with the spring combination (z2) having the same stiffness as for the conventional single spring (z1) described above, that is a stiffness of 1.91 kg/mm. The springs 17 and 18 are dual rate springs. The spring rates for inner spring 17 are greater than for the outer spring 18.

10

 Figures 6a to 6c respectively show the spring rate curves for outer spring 18 (Fig 6a) and inner spring 17 (Fig 6b), with the spring combination (z4) having the same

stiffness of 1.48 kg/mm as for the conventional single spring (z3) at "comfort" setting as described earlier.

The shock absorber with spring combination, formed by inner and outer springs 17 and 18 were then compared in performance with the single spring shock absorber, when set to the two stiffness values 1.48 kg/mm and 1.91 kg/mm. The results are provided in Table 2:

Table 2				
	Single Spring (z1)	Spring Combination (z2)	Single Spring (Comfort) (z3)	Spring Combination (Comfort) (z4)
Spring Stiffness (kg/mm)	1.91	1.91	1.48	1.48
Rider Comfort	100%	100%	122%	122%
A	217mm	174.8mm	251mm	193.8mm
B	77.5mm	120.5mm	43.6mm	101.5mm
C	328mm	328mm	328mm	328mm
Spring weight	100%	95%	138%	119%
Maximum Stress	65.12%	60.9%	65.12%	62.53%
Maximum Load (kg)	265	265	265	265
A is the assembled length of the spring. B is the distance between the lower spring seat 5 and bottom eyelet 15. C is the distance between top and bottom eyelets of the shock absorber * The spring stiffness is the first rate of the spring which plays a significant role in rider comfort. The maximum stress value is a measure of reliability, lower maximum stress percentage equating with better reliability.				

The advantages of the spring combination (z2) over the conventional spring (z1), for the same rider comfort and load capacity at spring stiffness 1.91 kg/mm, may be seen from the reduced spring assembled length (A), down 20% (that is, a reduction from 217 mm to 174.8 mm). The distance B, between the lower spring seat 5 and bottom eyelet 15, is increased 55% with benefit in terms of avoidance of fabrication of depressions in the

chain case to accommodate the spring seat. In other words, the chain case may be fabricated with a configuration independent of the design parameters of a shock absorber 1,201 mounted proximate to the component with consequential reduced manufacturing cost. This is evident from Figure 7, which depicts a motorcycle fitted with a rear shock absorber incorporating the invention. Figure 8 depicts a motorcycle fitted with a conventional single spring shock absorber, where a depression 50, as marked, has been provided on the chain case. Such a depression is absent on the chain case in the motorcycle with the invention.

There is also increased space available for the routing of the silencer in comparison with prior art shock absorbers allowing motorcycle design to accommodate the silencer in the increased space available using the spring combination shock absorber 1,201 of the present invention. The weight of spring material is also reduced by 5% and the maximum stress by 4.3%, allowing further advantage in terms of reduced spring material cost and usage.

If the single spring (z3) is compared even with the spring combination (z4) at the comfort setting of 1.48 kg/mm, there is still reduced assembled spring length, greater clearance of shock absorber to chain case and reduced maximum stress so the benefits remain apparent. The significant benefits also accrue for the comparison between spring combination and single spring set at the comfort stiffness setting of 1.48 kg/mm.

Further, if the single spring were configured to deliver more rider comfort (z3), the spring rate would be increased by 38%. The spring combination for the same rider comfort (z4) would result only in increased spring weight of 19%. Therefore, the spring combination is more efficient in terms of lesser usage of materials. Thus, a shock absorber 1, 201 providing significantly greater rider comfort is possible, at lower manufacturing cost than for a single spring shock absorber.

The dimensions, material properties and performance characteristics of the two configurations of the invention (that is, z2 and z4) are examples. The settings of spring stiffness (1.91 kg/mm and 1.48 kg/mm) are two examples for a known motorcycle.

CLAIMS:

1. A shock absorber (1) comprising a spring combination (17,18) having first and second spring elements (17,18) having capacity to store energy from vehicle vibrations, said first and second spring elements (17,18) being operatively disposed to share load due
5 to road induced vibrations during the motion of the vehicle (100).
2. A shock absorber (1) of claim 1 wherein shear stresses resulting from compression and expansion of the spring elements during motion of the vehicle (100) are within permissible limits.
3. The shock absorber (1) of claim 1 or 2 wherein the spring elements (17,18) bind
10 together.
4. The shock absorber (1) of claim 3 wherein the spring combination comprises a minimum of two spring elements (17,18).
5. The shock absorber (1) of claim 4 wherein the spring elements (17,18) have differing spring rates.
- 15 6. The shock absorber (1) of claim 4 wherein the spring elements (17,18) have plural spring rates.
7. The shock absorber (1) of claim 6 wherein the spring elements (17,18) have dual spring rates.
8. The shock absorber (1) of any one of the preceding claims wherein said spring
20 elements are disposed about a hydraulic cylinder (4) forming a further component of the shock absorber (1).
9. A shock absorber (201) as claimed in any one of the preceding claims wherein the spring elements (17,18) are spaced by a spacer (21) for avoiding frictional contact of the spring elements (17,18).

15

10. The shock absorber (1,201) as claimed in any one of the preceding claims wherein the spring stiffness of the spring combination (17,18) is selected to be the same as for a single spring shock absorber.

11. The shock absorber (1,201) of any one of the preceding claims, in use, having a clearance from the chain case of a motor cycle.

12. The shock absorber (1,201) comprising adjustment means for adjusting the pre compression of said spring elements (17,18).

13. A vehicle shock absorber (1) as claimed in any one of the preceding claims comprising:

10 a damper body (2) having a hydraulic cylinder (4); and
a pair of helical compression springs (17,18) pre-compressed to a predetermined load value, one spring (17) being an inner spring disposed over the hydraulic cylinder (4) and the other spring (18) being an outer spring disposed over the inner spring, the inner and outer springs for sharing load due to road induced vibrations during running of the vehicle.

14. A vehicle including a shock absorber (1,201) as claimed in any one of the preceding claims.

15. The vehicle of claim 14 wherein said shock absorber (1,201) forms part of a rear wheel suspension of a motorcycle (100).

20 16. The vehicle of claim 15 wherein said shock absorber (1,201) has a clearance from a chain case of the motorcycle (100).

17. The vehicle of claim 16 wherein a spring seat for springs (17,18) is formed independently of the chain case of the motorcycle (100).

25 18. A method of designing a motorcycle (100) having a shock absorber (1,201) as claimed in any one of claims 1 to 13 wherein space for routing a silencer is provided by selecting said shock absorber (1,201) over a shock absorber with a single spring.

16

19. A method of fabricating a motorcycle component wherein said component is fabricated with a configuration independent of the design parameters of a shock absorber (1,201) mounted proximate to the component.
20. The method of claim 19 wherein the component is a chain case of a motorcycle (100) and the design parameter of the shock absorber (1,201) is the assembled spring length of the shock absorber (1,201).
21. A shock absorber (1,201) substantially as hereinbefore described with reference to the Figures.

1/8

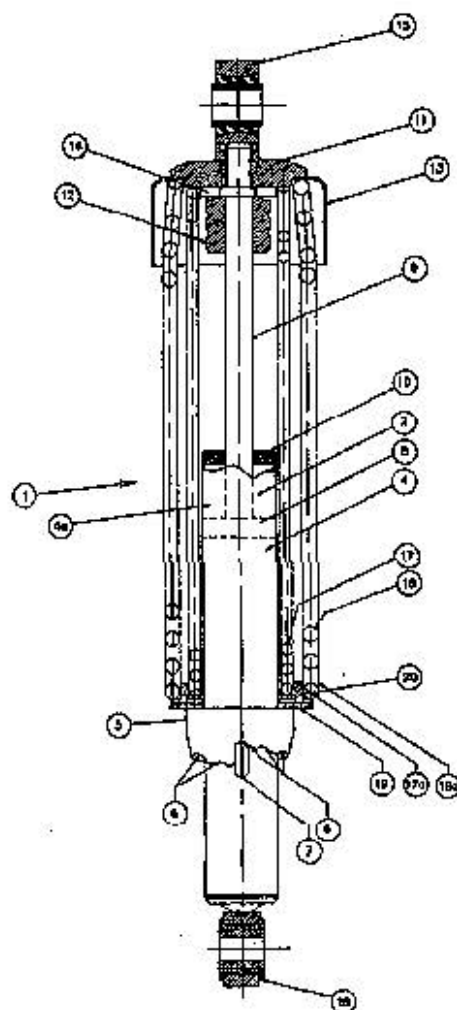


Figure 1

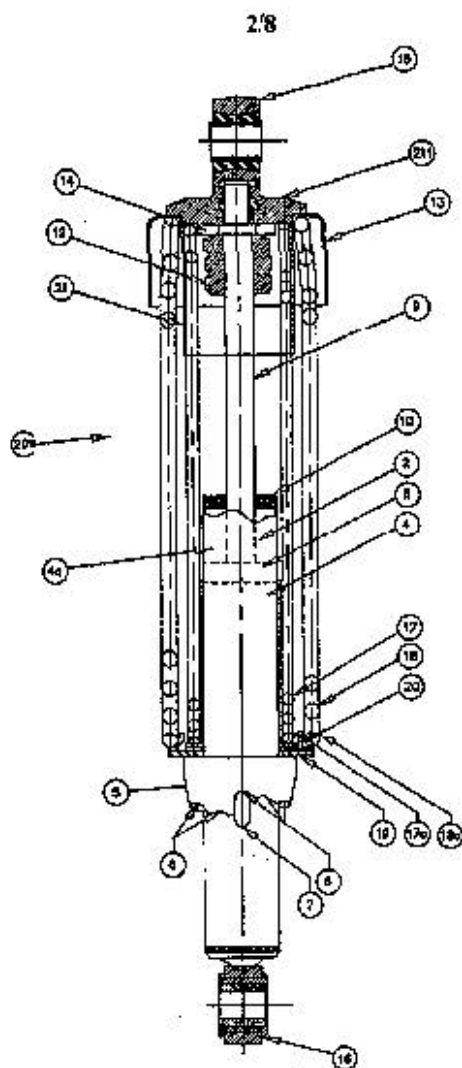


Figure 2.

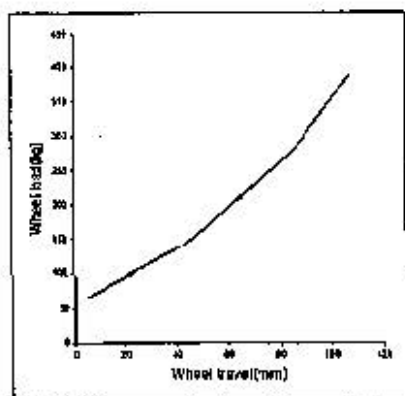


FIGURE 3a

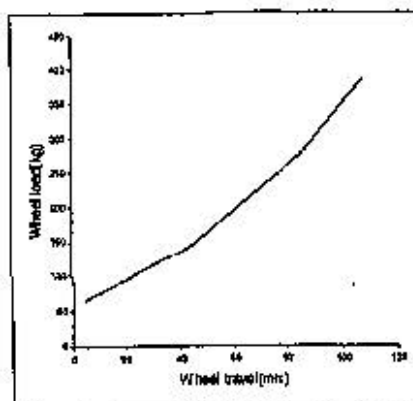


FIGURE 3b

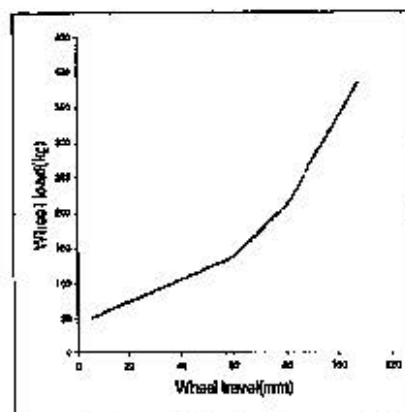


FIGURE 3c

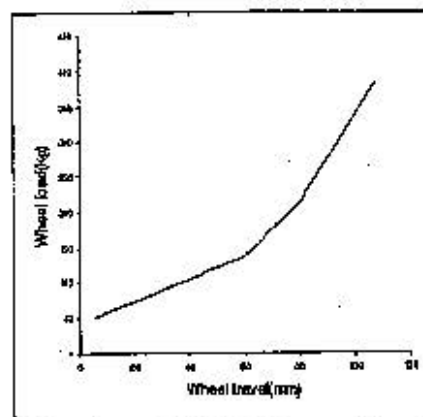


FIGURE 3d

5/8

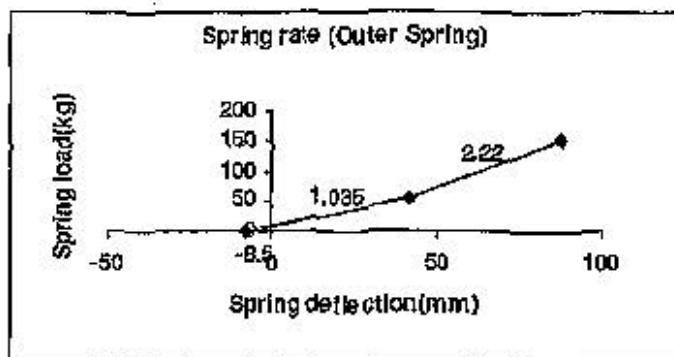


FIGURE 5a

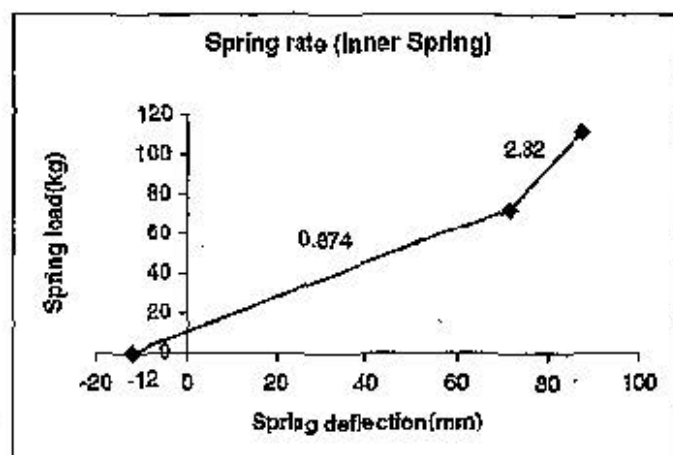


FIGURE 5b

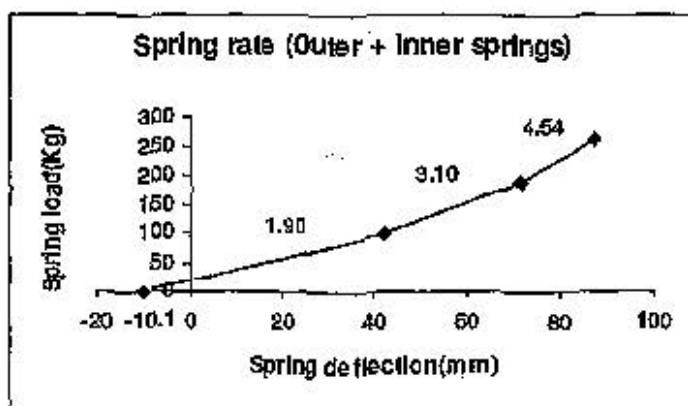


FIGURE 5c

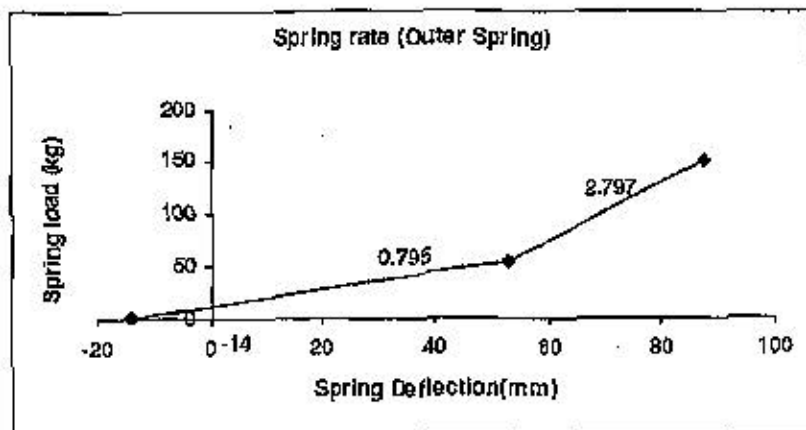


FIGURE 6a

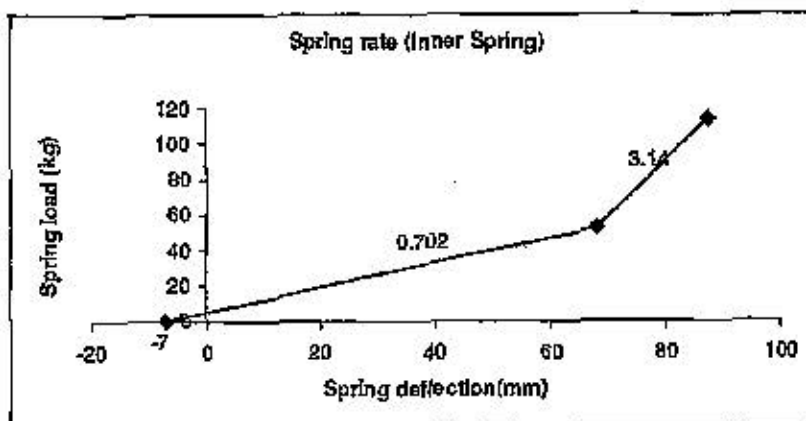


FIGURE 6b

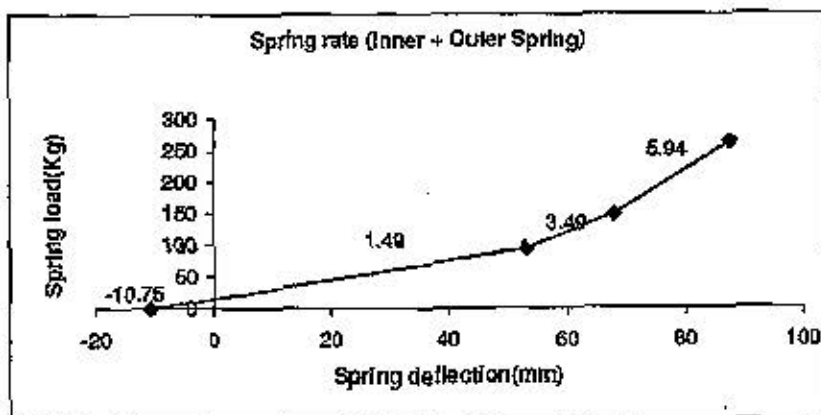


FIGURE 6c

21

27

22

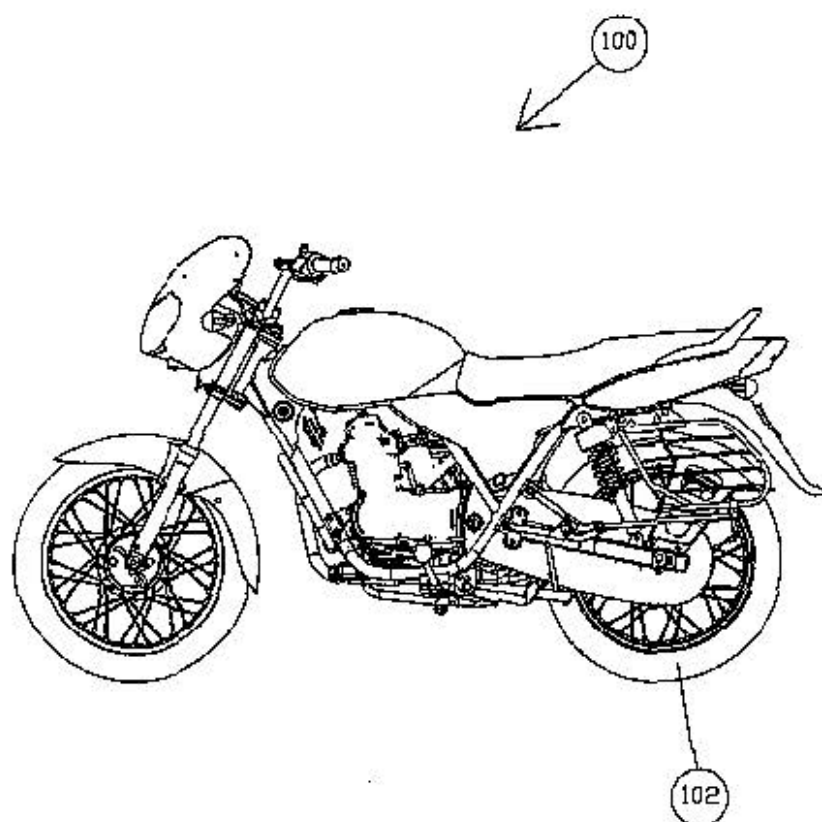


Figure 7

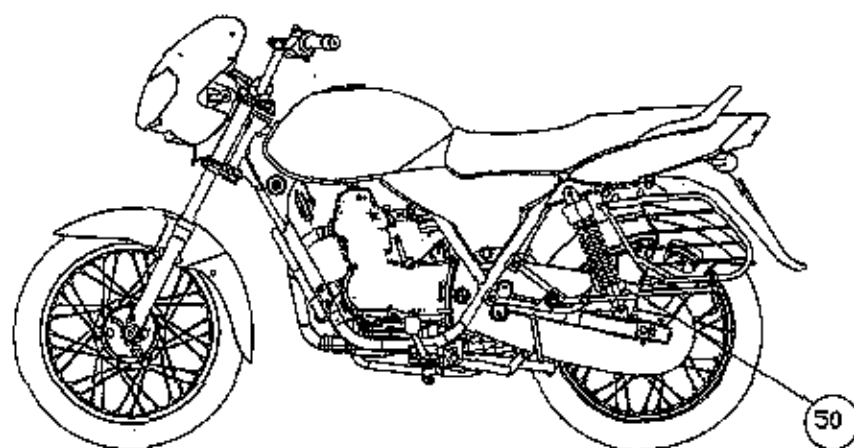


Figure 8

52

(19) World Intellectual Property Organization
International Bureau(43) International Publication Date
1 March 2007 (01.03.2007)

PCT

(10) International Publication Number
WO 2007/023506 A3

(51) International Patent Classification:

B60G 11/14 (2006.01) **B60G 11/56** (2006.01)**B60G 15/07** (2006.01) **F16F 7/00** (2006.01)**F16F 9/00** (2006.01)

(21) International Application Number:

PCT/IN2006/000201

(22) International Filing Date: 9 June 2006 (09.06.2006)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:

695/MUM/2005 10 June 2005 (10.06.2005) IN

(71) Applicant (for all designated States except US): **BAJAJ AUTO LIMITED** [IN/IN]; Akurdi, Pune 411 035 (IN).

(72) Inventor; and

(75) Inventor/Applicant (for US only): **ABRAHAM, Joseph** [IN/IN]; Bajaj Auto Limited, Akurdi, Pune 411 035, Maharashtra (IN).(74) Agents: **MADAN, Jose, A. et al.**; Khaitan & Co, Advocates, Notaries, Patent & Trade Mark Attorneys, Meher Chambers, 4th & 5th Floor, R K Marg, Ballard Estate, Mumbai 400 038, Maharashtra (IN).

(81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, LY, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NG, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RS, RU, SC, SD, SI, SG, SK, SL, SM, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

(84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SI, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IS, IT, LI, LU, LV, MC, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Declarations under Rule 4.17:

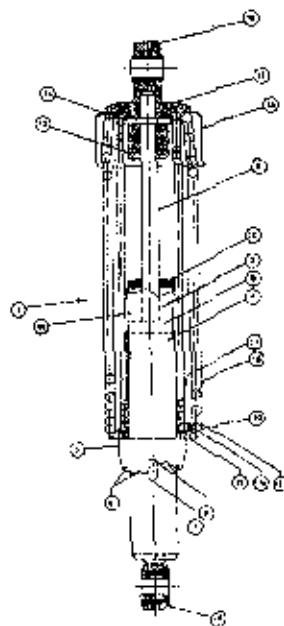
- as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii))
- of inventorship (Rule 4.17(iv))

Published:

- with international search report

{Continued on next page}

(54) Title: A SHOCK ABSORBER FOR A MOTOR VEHICLE



(57) Abstract: A shock absorber (1, 201) comprising a spring combination (17, 18) having first and second spring elements (17, 18) having capacity to store energy from vehicle vibrations, said first and second spring elements (17, 18) being operatively disposed to share load due to road induced vibrations and resultant shear stresses from compression and expansion of the spring elements during motion of the vehicle (100) are within allowable limits. Spring elements (17, 18) may be disposed over a hydraulic cylinder (4) forming a further element of the shock absorber. Such a shock absorber (1, 201) has cost, comfort and reliability advantages when applied to vehicles such as motorcycles.

INTERNATIONAL SEARCH REPORT

International application No.
PCT/IN2006/000201

A. CLASSIFICATION OF SUBJECT MATTER

Int. Cl.

B60G 11/14 (2006.01) B60G 15/07 (2006.01) F16F 9/00 (2006.01)
B60G 11/56 (2006.01) F16F 7/00 (2006.01)

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)

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)

DWPI IPC B60G 15/-, 17/-, B62K 25/-, F16F 7/-, 9/- & keywords: spring, coil, two, dual, second, twin, combination, addition, auxiliary, plus, supplement, double, cycle, bike or similar terms.

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 4126302 A (CURNUTT) 21 November 1978 Whole document	1-12, 14-18, 21
X	US 6691991 B1 (HUANG) 17 February 2004 Whole document	1-7, 9-12, 14-18, 21
X	US 3856285 A (YAMADA) 24 December 1974 See fig. 14	1-7, 9-12, 14-18, 21
X	US 2010623 A (BUGATTI) 6 August 1935 Whole document	1-7, 9-12, 14-18, 21



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	"I" 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
"E" earlier application or patent but published on or after the international filing date	"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
"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)	"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
"O" document referring to an oral disclosure, use, exhibition or other means	"&" document member of the same patent family
"P" document published prior to the international filing date but later than the priority date claimed	

Date of the actual completion of the international search
07 May 2007

Date of mailing of the international search report

10 MAY 2007

Name and mailing address of the ISA/AU

AUSTRALIAN PATENT OFFICE
PO BOX 200, WODEN ACT 2606, AUSTRALIA
E-mail address: pct@ipaaustralia.gov.au
Facsimile No. (02) 6285 3929

Authorized officer

B. NGUYEN
AUSTRALIAN PATENT OFFICE
(ISO 9001 Quality Certified Service)
Telephone No : (02) 6283 2306

INTERNATIONAL SEARCH REPORT

International application No.

PCT/IN2006/000201

Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:
2. ☐ Claims Nos.:
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:
3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a)

Box No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

1. Claims 1 - 17, 18: A shock absorber comprising a spring combination having first and second spring elements having capacity to store energy from vehicle vibrations.
2. Claims 19, 20: A method of fabricating a motorcycle component

as reasoned on the extra sheet

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying additional fees, this Authority did not invite payment of additional fees.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☒ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.: 1 - 18, 21

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.
- ☐ The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.
- ☐ No protest accompanied the payment of additional search fees.

INTERNATIONAL SEARCH REPORT

International application No.

PCT/IN2006/000201

Supplemental Box

(To be used when the space in any of Boxes I to VIII is not sufficient)

Continuation of Box No: III

The different inventions are:

1. Claims 1 to 17 are directed to a shock absorber, or a vehicle with a shock absorber, comprising a spring combination having first and second spring elements which are operatively disposed to share load due to road induced vibrations during the motion of the vehicle. It is considered that a shock absorber with these features comprises a first inventive concept and a first set of distinguishing features. Claim 18 is directed to a method of designing a motorcycle wherein the selection of the shock absorber as defined in claims 1 to 13 over a shock absorber with a single spring provides space for routing a silencer. While claim 18 is directed to a second inventive concept of routing a silencer in designing a motorcycle, the design method inherently follows from the shock absorber of claims 1 to 13. Consequently, claim 18 is inherently covered by the search of claims 1 to 17.

2. Claims 19 and 20 are directed to a third inventive concept being a method of fabricating a motorcycle component wherein the component is fabricated with a configuration independent of the design parameters of a shock absorber mounted proximate to the component. There is no claimed limitation on the proximate component which thus includes such a conventional component as the motorcycle rear wheel. Consequently, claims 19 and 20 are so unsupported by the description that a meaningful search could not be carried out. Claim 20 places no further meaningful limitation on claim 19, in that claim 20 specifies one particular design parameter whereas claim 19 requires independence of all design parameters. As well as being directed to a different inventive concept, claims 19 and 20 also do not share any potentially distinguishing features with any of claims 1 to 18.

PCT Rule 13.2, first sentence, states that unity of invention is only fulfilled when there is a technical relationship among the claimed inventions involving one or more of the same or corresponding special technical features. PCT Rule 13.2, second sentence, defines a special technical feature as a feature which makes a contribution over the prior art.

Each of the abovementioned groups of claims has a different distinguishing feature and they do not share any feature which could satisfy the requirement for being a special technical feature. Because there is no common special technical feature it follows that there is no technical relationship between the identified inventions. Therefore the claims do not satisfy the requirement of unity of invention *a priori*.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/IN2006/000201

This Annex lists the known "A" publication level patent family members relating to the patent documents cited in the above-mentioned international search report. The Australian Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

Patent Document Cited in Search Report		Patent Family Member	
US	4126302		
US	6691991		
US	3856285	JP	49012282
US	2010623	BE	398329
		FR	741637
Due to data integration issues this family listing may not include 10 digit Australian applications filed since May 2001.			
END OF ANNEX			

UN AMORTIGUADOR PARA UN VEHÍCULO MOTORIZADO

CAMPO DE LA INVENCIÓN

Esta invención se refiere a amortiguadores para
5 vehículos motorizados así como vehículos motorizados que
utilizar tales amortiguadores.

ANTECEDENTES DE LA INVENCIÓN

Los amortiguadores se utilizan en vehículos
10 motorizados para absorber o amortiguar vibraciones
inducidas por el terreno provocadas por superficies
desiguales del terreno, proporcionando así comodidad y
seguridad al conductor y al pasajero o motociclista en el
caso de una motocicleta o motoneta. Los amortiguadores
15 también soportan las cargas del vehículo.

Un amortiguador típico comprende un cilindro
hidráulico dispuesto operativamente con respecto a un
muelle de compresión helicoidal precomprimido en un valor
predeterminado de carga y dispuesto sobre el cilindro
20 hidráulico. El muelle puede disponerse sobre el cilindro
hidráulico entre el asiento inferior del muelle y el
asiento superior del muelle del amortiguador. Algunas veces
el cilindro hidráulico se refiere así mismo como
"amortiguador" puesto que es el cilindro y el fluido
25 contenidos dentro del mismo lo que absorbe la energía que

surge de la vibración del vehículo.

El muelle se comprime a un valor predeterminado de carga que tiene con respecto a los parámetros tales como el peso y la carga del vehículo que actúan sobre el vehículo así como la capacidad deseada de absorción de choques del amortiguador. Durante el movimiento del vehículo, el muelle se somete a compresión y extensión frecuentes debido a las vibraciones inducidas por el terreno. Esto crea esfuerzos cortantes en el muelle, conduce a fatiga del muelle y puede causar falla prematura del muelle reduciendo así la vida del amortiguador. La falla del muelle durante el movimiento del vehículo puede conducir también a serios accidentes.

La capacidad de los amortiguadores para absorber o amortiguar vibraciones y carga inducidas por el terreno y soportar la carga del vehículo depende de varios factores que incluyen el diámetro del muelle, la longitud del muelle y las características del muelle. Esto también es necesario para comodidad del motociclista. La reducción en longitud de un muelle conduce a una reducción en el número de vueltas para un diámetro de alambre de muelle dado y el diámetro promedio de la espira y la carrera dada del muelle y, por lo tanto, una suspensión más rígida y comodidad reducida para el motociclista. La longitud total del amortiguador depende de la longitud precomprimida del

muelle. Un ajuste de menor longitud del muelle, puede ser posible al ajustar la posición del asiento inferior del muelle. Sin embargo, en el caso usual donde el amortiguador se sitúa cerca del cuerpo de la motocicleta, generalmente se requiere que el guardacadena en un lado y el reductor o silenciador en el otro lado del vehículo tengan depresiones para proporcionar suficiente huelgo para una localización adecuada del asiento inferior del muelle de los amortiguadores. La fabricación de tales depresiones crea costos adicionales de fabricación ya que se requiere fabricación adicional. Además, la limitación consecuente en la orientación del silenciador, el ruido irritante incrementado debido al desgaste de cadena de la motocicleta contra la depresión en el guardacadena y la estética reducida del vehículo, son problemáticos con tales disposiciones.

Una alternativa a tales disposiciones es el montaje de un amortiguador lejos del cuerpo del vehículo. Tal disposición requiere un refuerzo adicional el cual se agrega al costo de un vehículo.

Por lo tanto, es un objeto de la invención proporcionar un amortiguador que tenga confiabilidad y duración mejoradas.

Otro objeto de la invención es proporcionar un amortiguador que comprende muelles precomprimidos de

longitud reducida.

Otro objeto de la invención es proporcionar un amortiguador que permita una comodidad incrementada de recorrido; en una forma óptima con una disposición que
5 puede montarse convenientemente en la motocicleta sin costo que induzca operaciones adicionales de fabricación.

SUMARIO DE LA INVENCION

En vista de estos objetos, la presente invención
10 proporciona un amortiguador que comprende una combinación de muelles que tiene primer y segundo elementos de muelle que tienen capacidad de almacenar energía a partir de las vibraciones del vehículo, el primer y segundo elementos de muelle se disponen operativamente para compartir la carga
15 debido a las vibraciones inducidas por el terreno. De esta manera, los esfuerzos cortantes resultantes que resultan de la compresión y la extensión de los elementos de muelle durante el movimiento del vehículo están dentro y pueden estar bien por debajo de los límites permitidos. La
20 disposición operativa de los muelles puede involucrar la conexión conjunta de los muelles.

Cada elemento de muelle, puede ser más de dos, puede tener una proporción de flexión diferente, una proporción de flexión de muelles dentro de la combinación
25 que se selecciona para lograr el grado deseado de comodidad

para el motociclista. Los elementos de muelle pueden ser muelles de proporción doble o variada. Las proporciones de muelle pueden seleccionarse para que la tenacidad de la combinación de muelles sea la misma que para un muelle sencillo, incluso con una longitud más de muelle más corta que para una disposición de muelle sencillo comparable. Además, la longitud reducida del muelle permite un mayor huelgo de un guardacadena de una motocicleta y permite que se reduzca o evite la fabricación de depresiones, y el
5
10 desgaste y ruido consiguientes.

Tal amortiguador puede comprender un cuerpo de cilindro hidráulico o regulador, con la combinación de muelles tomando la forma de un par de muelles helicoidales precomprimidos a un valor predeterminado de carga. Los
15 muelles pueden incluir un muelle interno dispuesto sobre el cilindro hidráulico y un muelle externo dispuesto sobre el muelle interno. Cada extremo de cada muelle se sitúa en un asiento de muelle. La precompresión de ambos muelles puede ser ajustada al ajustar la posición de un asiento de
20 muelle, de preferencia el asiento inferior del muelle para la flexión.

Un extremo del muelle externo, por ejemplo, el extremo inferior, se puede situar en un localizador exterior, - en el caso preferido - éste se sitúa en el
25 asiento inferior del muelle. Similarmente, un extremo del

muelle interno - otra vez convenientemente el extremo inferior - se sitúa contra un localizador interno situado en el asiento inferior del muelle.

El amortiguador puede comprender un espaciador
5 proporcionado entre los muelles para prevenir la fricción y desgaste a través del movimiento relativo de los muelles. Este espaciador se puede situar en uno de los asientos del muelle, por ejemplo, el asiento superior del muelle. El amortiguador se puede aplicar a cualquier vehículo pero
10 particularmente es bien adecuado para vehículos de dos ruedas tales como motocicletas y motonetas o vehículos de tres ruedas. El amortiguador se puede incluir convenientemente dentro de una suspensión de rueda posterior de vehículo.

15 Las características de los muelles que forman la combinación de muelles del amortiguador se pueden seleccionar con el objeto de reducir el costo de fabricación del vehículo. Ya que la longitud del muelle ensamblado es menor para la comodidad proporcionada al
20 motociclista y el esfuerzo cortante máximo aceptable, se puede hacer disponible más espacio para la guía de un silenciador de motocicleta. Los huelgos entre el guardacadena y el amortiguador también pueden permitir que las operaciones de fabricación se simplifiquen, puesto que
25 ya no es necesario fabricar otros componentes de la

motocicleta para acomodar el amortiguador, por ejemplo, a través de la fabricación de depresiones en el guardacadena, etc.

5

BREVE DESCRIPCIÓN DE LAS FIGURAS

El amortiguador de la invención se puede entender más completamente a partir de la siguiente descripción de las modalidades preferidas de la misma, descritas con referencia a los dibujos anexos en los cuales:

10

la Figura 1 es una vista en corte transversal lateral de un amortiguador de acuerdo con una modalidad de la presente invención;

15

la Figura 2 es una vista en corte transversal lateral de un amortiguador de acuerdo con una segunda modalidad de la presente invención;

las Figuras 3a a 3d proporcionan la deflexión de las ruedas para las características de carga de cuatro tipos (z1) a (z4) de la suspensión de rueda posterior,

en otras palabras:

20

(z1) amortiguador con un muelle sencillo convencional que tiene tenacidad de 1.91 kg/mm;

(z2) amortiguador que incorpora la presente invención con su combinación de muelles configurada para la comodidad del motociclista y capacidad de carga iguales que

25

(z1);

(z3) amortiguador con un muelle sencillo convencional con una tenacidad inferior de 1.48 kg/mm. (un ajuste llamado "comodidad"); y

(z4) amortiguador que incorpora la presente
5 invención con su combinación de muelles configurada para la comodidad del motociclista y capacidad de carga iguales que (z3).

Las Figuras 4a y 4b indican curvas de proporción de flexión para el muelle sencillo del amortiguador (z1) y
10 el muelle sencillo del amortiguador (z3);

Las Figuras 5a a 5c indican curvas de proporción de flexión para los elementos de muelle exterior e interior y la combinación de muelles del amortiguador (z2) de la invención y para la cual se muestra la deflexión de las
15 ruedas para la característica de carga en la Figura 3b;

las Figuras 6a a 6c indican curvas de proporción de flexión para los elementos de muelle exterior e interior y la combinación de muelles del amortiguador (z4) de la invención y para la cual se muestra la deflexión de las
20 ruedas para la característica de carga en la Figura 3d; y

la Figura 7 es una vista de una motocicleta que incorpora un amortiguador de acuerdo con una modalidad de la presente invención.

La Figura 8 es una vista de una motocicleta con
25 un amortiguador de muelle sencillo convencional.

DESCRIPCIÓN DETALLADA DE LA INVENCION

Con referencia ahora a las Figuras 1 y 7, se muestra la localización y el diseño de un amortiguador 1 utilizado como parte de la suspensión de la rueda posterior de una motocicleta 100. El amortiguador 1 para la rueda 102 posterior comprende un cuerpo 2 regulador que comprende un cilindro 4 hidráulico que absorbe las vibraciones provocadas al conducir la motocicleta 100 a lo largo de un terreno desigual. El cilindro 4 hidráulico incluye un pistón 8 y la biela 9 del pistón que se mueve a través del cilindro 4 de acuerdo con el movimiento de la motocicleta 100 a lo largo del terreno. La biela 9 del pistón es bloqueada en su posición por la tuerca 14 de fijación. El fluido hidráulico es un aceite de densidad y viscosidad deseada para la aplicación de suspensión y la porción 4a de trabajo del cilindro 4 es sellada por la arandela 10 de sello de aceite. La cubierta 13 para polvo también sella el cilindro 4 contra el ingreso de polvo o de suciedad. El amortiguador también incluye una combinación de muelles que comprende un par de muelles 17 y 18. Los muelles 17 y 18 son muelles de compresión helicoidales pretensados en un valor predeterminado de carga que tiene con respecto a los parámetros tales como el peso del vehículo y la carga en el vehículo y la capacidad deseada de absorción de choque del

amortiguador 1.

Los elementos de muelle son muelles. El muelle 17 es un muelle interior dispuesto sobre el cilindro 4 hidráulico. El muelle 18 es un muelle exterior dispuesto sobre un cilindro 4 hidráulico y el muelle 17 interior. Los muelles 17 y 18 se disponen operativamente con relación entre sí y se unen, durante su uso, para compartir la carga que actúa sobre la motocicleta 100 durante su recorrido a lo largo del terreno.

El muelle 18 exterior se sitúa contra un localizador 19 exterior situado en un asiento 5 inferior del muelle. El muelle 17 interior se sitúa contra el localizador 20 interno también situado en el asiento 5 inferior del muelle. El amortiguador 1 se monta en el cuerpo del vehículo (no mostrado) por medios de sujeción asegurados a través de los ojales 15 y 16 superior e inferior.

El cilindro 4 hidráulico se proporciona con un asiento 5 inferior ajustable del muelle que acomoda los extremos inferiores 17a y 18a de los muelles 17 y 18. El asiento 5 inferior del muelle se proporciona con un número de perfiles 6 de leva situados a diferentes alturas que permiten diferentes ajustes para el asiento 5 inferior del muelle. De esta manera, la precompresión se puede ajustar para lograr un nivel deseado de comodidad para el

motociclista. El cilindro 4 hidráulico también se proporciona con un par de proyecciones, del cual una proyección 7 se muestra en la Figura 1.

El ajuste de la altura del asiento 5 inferior del muelle, muelle -precompresión y comodidad deseada del motociclista, se logra al rotar o girar el asiento 5 inferior del muelle en el cilindro 4 hidráulico que forma parte del medio de ajuste para la tenacidad de flexión de los muelles 17 y 18. El asiento 5 inferior del muelle se desliza hacia arriba o hacia abajo en el cilindro 4 hidráulico contra las proyecciones 7 y se acopla con un perfil 6 de leva para levantar o bajar la altura del asiento 5 inferior del muelle en el cilindro 4 hidráulico cuando se requiera.

Los extremos superiores de los muelles 17 y 18 se asientan en el asiento 11 superior del muelle que se adaptan en la biela 9 del pistón. Un tope 12 de choque de compresión adaptado en la biela 9 del pistón, absorbe el choque de cualquier movimiento accidentado del pistón 8.

El amortiguador 201 de la Figura 2 difiere del amortiguador 1 de la Figura 1 en que un espaciador 21 se proporciona entre los muelles 17 y 18. El espaciador 21 se sitúa en el asiento 211 superior del muelle del amortiguador 201. El espaciador 21 previene el contacto y el desgaste por la acción de fricción de los muelles 17 y

18 entre si. Por lo tanto, el espaciador 21 se forma idealmente a partir de un polímero de baja fricción tal como nylon o polipropileno. Un espaciador también se puede proporcionar entre el cilindro 4 hidráulico y el muelle 17 interior para prevenir el contacto y el desgaste por la acción de fricción del muelle contra el cilindro hidráulico.

Durante la condición de funcionamiento de un vehículo adaptado con el amortiguador 1 ó 201 de la invención, ambos muelles 17 y 18 internos y externos soportan la carga del vehículo y se someten a compresión y extensión frecuentes debido a las vibraciones inducidas por el terreno. La carga debido a las vibraciones inducidas por el terreno y los esfuerzos cortantes resultantes que resultan de la compresión y extensión de los muelles 17 y 18 durante el movimiento de la motocicleta 100 se comparten por los muelles. Por lo tanto, la fatiga del muelle y las posibilidades de falla prematura del muelle se reducen. Incluso si uno de los muelles 17 y 18 falla durante el movimiento del vehículo, el amortiguador 1 ó 201 puede funcionar aún con un muelle, por lo menos durante cierto tiempo. El riesgo de que ambos muelles 17 y 18 fallen simultáneamente es de muy bajo a insignificante, ya que los muelles 17 y 18 se seleccionan para condiciones de funcionamiento esperadas. Por lo tanto, se mejoran la

duración y confiabilidad del amortiguador 1, 201.

El grado de participación de los esfuerzos cortantes y de la carga del vehículo se puede lograr mediante la selección adecuada de parámetros como las
5 características del diámetro y la longitud y la flexión de los muelles. Al mismo tiempo, la longitud efectiva de los muelles precomprimidos puede ser reducida sin reducir las características del amortiguador 1, 201 y comodidad del motociclista.

10 Con referencia ahora a las Figuras 3 a 6, las características y ventajas del amortiguador 1, 201 de la invención se pueden demostrar comparativamente con los amortiguadores de muelles sencillos de la técnica anterior. Las Figuras 3a a 3d proporcionan la deflexión de las ruedas
15 para las características de carga ("proporciones de las ruedas") como se describe en lo anterior. Las proporciones de las ruedas se traslapan para los amortiguadores de muelles sencillos y dobles establecidos en el mismo valor de tenacidad.

20 Las Figuras 4a y 4b muestran las curvas de proporción de flexión para los muelles establecidos en la tenacidad inicial de 1.91 kg/mm (z1) y 1.48 kg/mm (z3), el ajuste de "comodidad" para una sola condición del motociclista en un vehículo de dos ruedas.

25 Las características de diseño de los muelles 17 y

18, de acuerdo con la invención, establecidas en los dos valores de tenacidad 1.48kg/mm y 1.91 kg/mm, así como para un amortiguador de muelles sencillos se informan en la Tabla 1 siguiente:

5

Tabla 1							
		Combinación de Muelles (z2)		Combinación de Muelles (comodidad) (z4)		Muelle Sencillo (z1)	Muelle Sencillo (comodidad) (z3)
		Exterior	Interior	Exterior	Interior		
A	Diámetro de alambre (mm)	6.5	5	6.5	5	7.5	7.5
B	Diámetro promedio de espiral (mm)	55	36.5	55	36.5	48	48
C	Espirales activas	10.75	15.25	14	19	15.5	20
D	Espirales totales	12.25	16.25	15.5	20.5	17	21.5
E	Pre carga (mm)	8.5	12	14	7	10	12
	Material	De acuerdo con IS4454-GR-3					

10

15

20

Las Figuras 5a a 5c respectivamente muestran las curvas de proporción de flexión para el muelle 18 exterior (Figura 5a) y el muelle 17 interior (Figura 5b), con la combinación de muelles (z2) teniendo la misma tenacidad que para el muelle sencillo convencional (z1) descrito en lo anterior, que es una tenacidad de 1.91 kg/mm. Los muelles

25

45

17 y 18 son muelles de doble proporción. Las proporciones de flexión para el muelle 17 interior son mayores que para el muelle 18 exterior.

Las Figuras 6a a 6c respectivamente muestran las curvas de proporción de flexión para el muelle 18 exterior (Figura 6a) y el muelle 17 interior (Figura 6b), con la combinación de muelles (z4) teniendo igual tenacidad de 1.48 kg/mm que para el muelle sencillo convencional (z3) en el ajuste de "comodidad" como se describe en lo anterior.

El amortiguador con la combinación de muelles, formada mediante muelles 17 y 18 internos y externos entonces se comparó en rendimiento con el amortiguador de muelles sencillos, cuando se estableció en los dos valores de tenacidad de 1.48 kg/mm y 1.91 kg/mm. Los resultados se proporcionan en la Tabla 2:

Tabla 2					
	Muelle Sencillo (z1)	Combinación de Muelles (z2)	Muelle Sencillo (comodidad) (z3)	Combinación de Muelles (comodidad) (z4)	
5	Tenacidad de Flexión (kg/mm)	1.91	1.91	1.48	1.48
	Comodidad para el Motociclista	100%	100%	122%	122%
	A	217 mm	174.8 mm	251 mm	193.8 mm
	B	77.5 mm	120.5 mm	43.5 mm	101.5 mm
	C	328 mm	328 mm	328 mm	328 mm
	Peso del Muelle	100%	95%	138%	119%
	Tensión Máxima	65.12%	60.9%	65.12%	62.53%
10	Carga Máxima (kg)	265	265	265	265
A es la longitud del muelle ensamblado. B es la distancia entre el asiento 5 inferior del muelle y el ojal 15 inferior. C es la distancia entre los ojales superior e inferior del amortiguador * La tenacidad de flexión es la primera proporción de flexión que representa un papel importante en la comodidad del motociclista muelle. El valor de tensión máxima es una medida de confiabilidad, un menor porcentaje de tensión máxima que se iguala con mejor fiabilidad.					
15					

Las ventajas de la combinación de muelles (z2) sobre el muelle convencional (z1), para la misma comodidad del motociclista y capacidad de carga en la tenacidad de flexión de 1.91 kg/mm, se puede observar a partir de la longitud del muelle ensamblado reducido (A), menos del 20% (es decir, una reducción de 217 mm a 174.8 mm). La distancia B, entre el asiento 5 inferior del muelle y el ojal 15 inferior, se incrementa a 55% con el beneficio en términos de evasión de fabricación de depresiones en el guardacadena para acomodar el asiento de muelle. En otras

palabras, el guardacadena se puede fabricar con una configuración independiente de los parámetros de diseño de un amortiguador 1, 201 montado cerca del componente con costo de fabricación reducido consecuente. Esto es evidente a partir de la Figura 7, que representa una motocicleta adaptada con un amortiguador posterior que incorpora la invención. La Figura 8 representa una motocicleta adaptada con un amortiguador convencional de muelles sencillos, donde una depresión 50, como se marca, se ha proporcionado en el guardacadena. Tal depresión está ausente en el guardacadena en la motocicleta de la invención.

También existe espacio incrementado disponible para la guía del silenciador en comparación con los amortiguadores de la técnica anterior que permiten que el diseño de motocicleta acomode el silenciador en el espacio incrementado disponible utilizando el amortiguador 1, 201 de combinación de muelles de la presente invención. El peso del material para muelles también se reduce por 5% y la tensión máxima por 4.3%, permitiendo una ventaja adicional en términos de costo y uso reducidos de materiales para muelles.

Si el muelle (23) sencillo se compara incluso con la combinación de muelles (24) en el ajuste de comodidad de 1.48 kg/mm, aún se reduce la longitud del muelle ensamblado, mayor huelgo del amortiguador para el

guardacadena y tensión máxima reducida de tal manera que las ventajas siguen siendo evidentes. Los beneficios significativos también se acrecientan para la comparación entre la combinación de muelles y el conjunto de muelles sencillos en el ajuste de tenacidad para la comodidad de 1.48 kg/mm.

Además, si el muelle sencillo se configurara para distribuir más comodidad para el motociclista (z3), se incrementaría la proporción de flexión por 38%. La combinación de muelles para la misma comodidad del motociclista (z4) daría lugar solamente al peso incrementado del muelle por 19%. Por lo tanto, la combinación de muelles es más eficiente en términos de menor uso de materiales. De este modo, es posible un amortiguador 1, 201 que proporcione una comodidad para el motociclista significativamente mayor, a un menor costo de fabricación que para un amortiguador de muelles sencillos.

Las dimensiones, propiedades del material, y características de rendimiento de las dos configuraciones de la invención (es decir, z2 y z4) son ejemplos. Los ajustes de la tenacidad de flexión (1.91 kg/mm y 1.48 kg/mm) son dos ejemplos para una motocicleta conocida. Es posible lograr resultados similares para diferentes ajustes de tenacidad adecuados para diferentes vehículos motorizados.

NOVEDAD DE LA INVENCION

Habiendo descrito la presente invención se considera como novedad y por lo tanto se reclama como propiedad lo descrito en las siguientes reivindicaciones.

5

REIVINDICACIONES

1. Un amortiguador (1) caracterizado porque comprende una combinación de muelles (17, 18) que tiene primer y segundo elementos de muelle (17, 18) que tienen
10 capacidad de almacenar energía a partir de las vibraciones del vehículo, el primer y segundo elementos de muelle (17, 18) se disponen operativamente para compartir la carga debido a las vibraciones inducidas por el terreno durante el movimiento del vehículo (100).

15 2. El amortiguador (1) de conformidad con la reivindicación 1, caracterizado porque los esfuerzos cortantes que resultan de la compresión y extensión de los elementos de muelle durante el movimiento del vehículo (100) están dentro de límites permitidos.

20 3. El amortiguador (1) de conformidad con la reivindicación 1 ó 2, caracterizado porque los elementos de muelle (17, 18) se unen juntos.

4. El amortiguador (1) de conformidad con la reivindicación 3, caracterizado porque la combinación de
25 muelles comprende un mínimo de dos elementos de muelle (17,

18).

5. El amortiguador (1) de conformidad con la reivindicación 4, caracterizado porque los elementos de muelle (17, 18) tienen diferentes proporciones de flexión.

5 6. El amortiguador (1) de conformidad con la reivindicación 4, caracterizado porque los elementos de muelle (17, 18) tienen varias proporciones de flexión.

7. El amortiguador (1) de conformidad con la reivindicación 6, caracterizado porque los elementos de muelle (17, 18) tienen proporciones de doble flexión.

8. El amortiguador (1) de conformidad con cualquiera de las reivindicaciones precedentes, caracterizado porque los elementos de muelle (17, 18) se disponen sobre un cilindro hidráulico (4) que forma otro componente del amortiguador (1).

9. El amortiguador (201) de conformidad con cualquiera de las reivindicaciones precedentes, caracterizado porque los elementos de muelle (17, 18) son espaciados por un espaciador (21) para evitar el contacto por fricción de los elementos de muelle (17, 18).

10. El amortiguador (1, 201) de conformidad con cualquiera de las reivindicaciones precedentes, caracterizado porque la tenacidad de flexión de la combinación de muelles (17, 18) se selecciona para ser igual que para un amortiguador de muelles sencillos.

11. El amortiguador (1, 201) de conformidad con cualquiera de las reivindicaciones precedentes, en uso, caracterizado porque tiene un huelgo de guardacadena de un ciclo de motor.

5 12. El amortiguador (1, 201) caracterizado porque comprende medios de ajuste para ajustar la precompresión de los elementos de muelle (17, 18).

13. Un amortiguador (1) de vehículo de conformidad con cualquiera de las reivindicaciones precedentes, caracterizado porque comprende:

un cuerpo regulador (2) que tiene un cilindro hidráulico (4); y

un par de muelles de compresión helicoidales (17, 18) precomprimidos en un valor predeterminado de carga, un
15 muelle (17) que es un muelle interno dispuesto sobre el cilindro hidráulico (4) y el otro muelle (18) que es un muelle exterior dispuesto sobre el muelle interno, los muelles internos y externos para compartir la carga debido a las vibraciones inducidas por el terreno durante el
20 funcionamiento del vehículo.

14. Un vehículo que incluye un amortiguador (1, 201) de conformidad con cualquiera de las reivindicaciones precedentes.

15. El vehículo de conformidad con la
25 reivindicación 14, caracterizado porque el amortiguador (1,

201) forma parte de una suspensión de la rueda posterior de una motocicleta (100).

16. El vehículo de conformidad con la reivindicación 15, caracterizado porque el amortiguador (1, 201) tiene un huelgo de un guardacadena de la motocicleta (100).

17. El vehículo de conformidad con la reivindicación 16, caracterizado porque un asiento de muelle para los muelles (17, 18) se forma independientemente del guardacadena de la motocicleta (100).

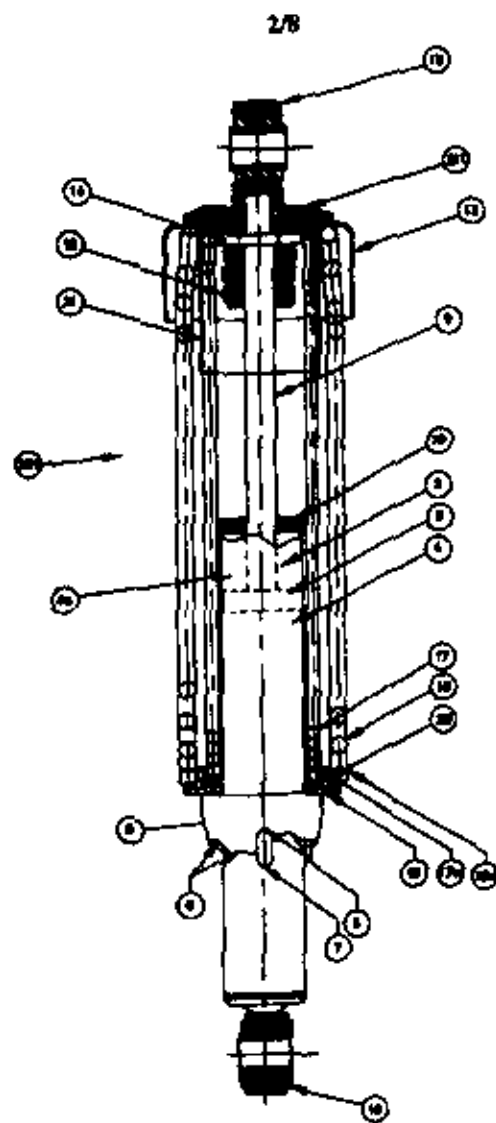
18. El método para diseñar una motocicleta (100) que tiene un amortiguador (1, 201) de conformidad con cualquiera de las reivindicaciones 1 a 13, caracterizado porque el espacio para guiar un silenciador se proporciona al seleccionar el amortiguador (1, 201) sobre un amortiguador con muelle sencillo.

19. Un método para fabricar un componente de motocicleta, caracterizado porque el componente se fabrica con una configuración independiente de los parámetros de diseño de un amortiguador (1, 201) montado cerca de un componente.

20. El método de conformidad con la reivindicación 19, caracterizado porque el componente es un guardacadena de una motocicleta (100) y el parámetro de

RESUMEN DE LA INVENCIÓN

Un amortiguador (1, 201) que comprende una combinación (17, 18) de muelles que tiene primer y segundo elementos (17, 18) de muelle que tienen capacidad de almacenar energía a partir de las vibraciones del vehículo, el primer y segundo elementos (17, 18) de muelle se disponen operativamente para compartir la carga debido a las vibraciones inducidas por el terreno y los esfuerzos cortantes resultantes de la compresión y la extensión de los elementos de muelle durante el movimiento del vehículo (100) están dentro de los límites permitidos. Los elementos (17, 18) de muelle pueden disponerse sobre un cilindro (4) hidráulico que forma un elemento adicional del amortiguador. Tal amortiguador (1, 201) tiene ventajas de costo, comodidad, y fiabilidad cuando se aplican a vehículos tales como motocicletas.



ER

3/8

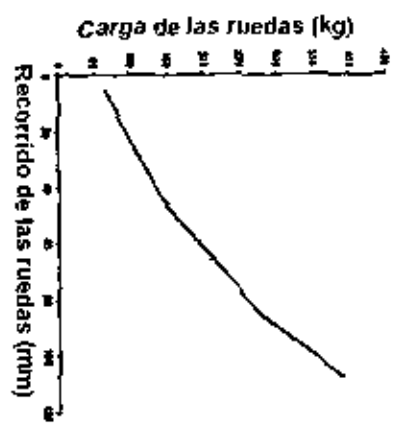


FIGURA 3a

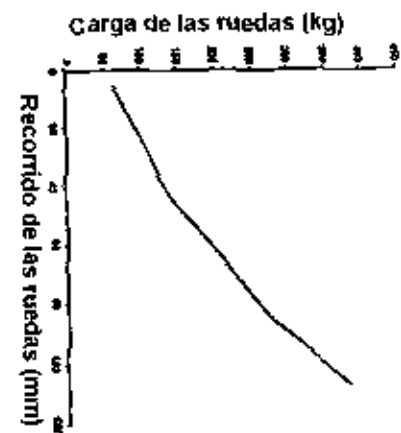


FIGURA 3b

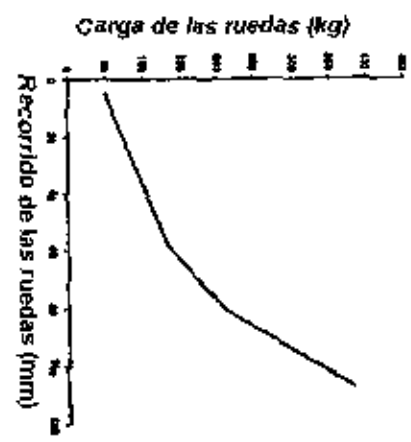


FIGURA 3c

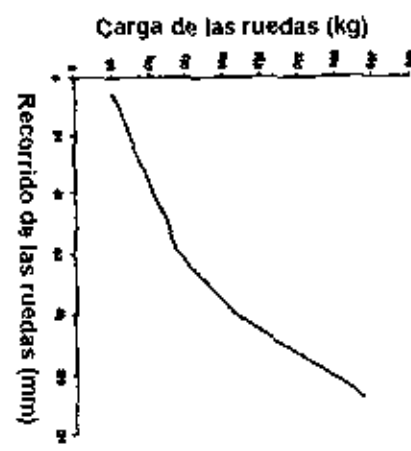


FIGURA 3d

7/8

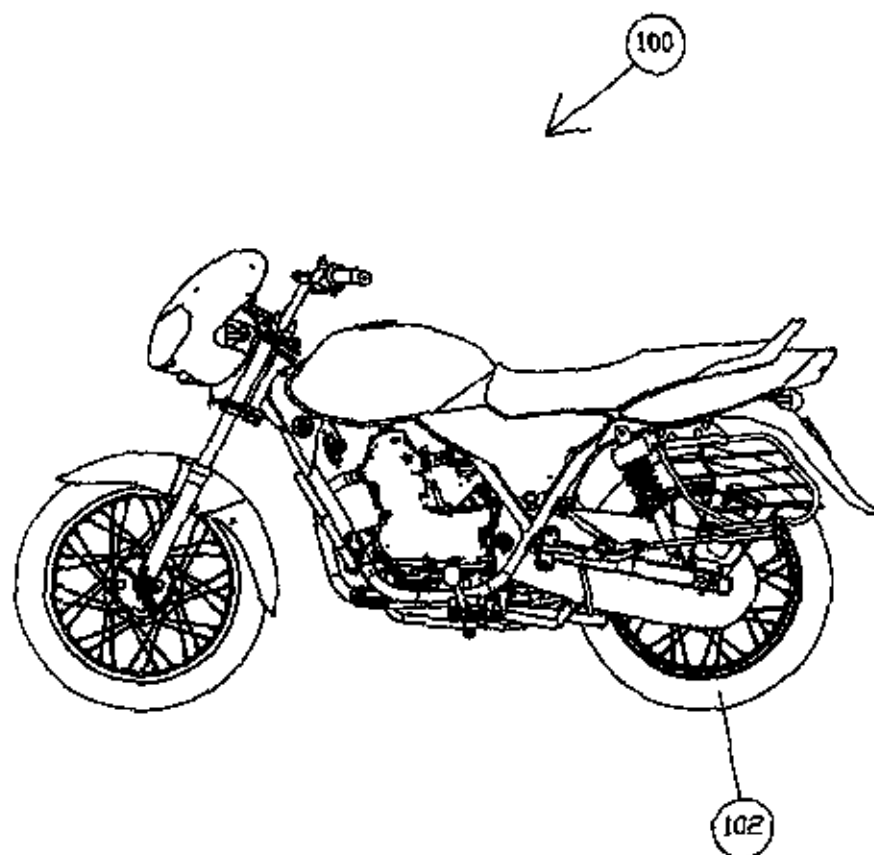
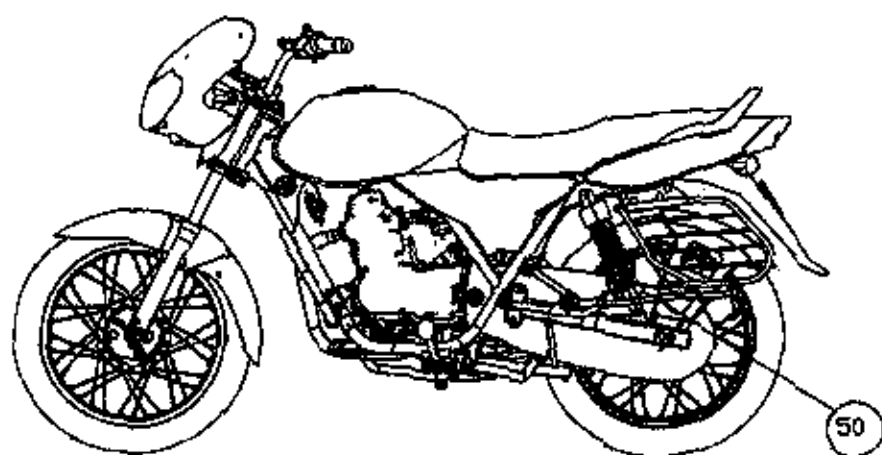


FIGURA 7

8/8

**FIGURA 8**

CS

From the INTERNATIONAL BUREAU

PCTNOTIFICATION CONCERNING
SUBMISSION OR TRANSMITTAL
OF PRIORITY DOCUMENT

(PCT Administrative Instructions, Section 411)

To:

MADAN, Jose, A.
Khatan & Co
Advocates, Notaries, Patent & Trade Mark Attorneys
Meher Chambers, 4th & 5th Floor
R K Marg, Ballard Estate
Mumbai 400 038, Maharashtra
INDE

Date of mailing (day/month/year) 15 March 2007 (15.03.2007)	IMPORTANT NOTIFICATION
Applicant's or agent's file reference KM-026	
International application No. PCT/IN2006/000201	International filing date (day/month/year) 09 June 2006 (09.06.2006)
International publication date (day/month/year) 01 March 2007 (01.03.2007)	Priority date (day/month/year) 10 June 2005 (10.06.2005)
Applicant BAJAJ AUTO LIMITED et al	

- By means of this Form, which replaces any previously issued notification concerning submission or transmittal of priority documents, the applicant is hereby notified of the date of receipt by the International Bureau of the priority document(s) relating to all earlier application(s) whose priority is claimed. Unless otherwise indicated by the letters "NR", in the right-hand column or by an asterisk appearing next to a date of receipt, the priority document concerned was submitted or transmitted to the International Bureau in compliance with Rule 17.1(a) or (b).
- (If applicable)* The letters "NR" appearing in the right-hand column denote a priority document which, on the date of mailing of this Form, had not yet been received by the International Bureau under Rule 17.1(a) or (b). Where, under Rule 17.1(a), the priority document must be submitted by the applicant to the receiving Office or the International Bureau, but the applicant fails to submit the priority document within the applicable time limit under that Rule, the attention of the applicant is directed to Rule 17.1(c) which provides that no designated Office may disregard the priority claim concerned before giving the applicant an opportunity, upon entry into the national phase, to furnish the priority document within a time limit which is reasonable under the circumstances.
- (If applicable)* An asterisk (*) appearing next to a date of receipt, in the right-hand column, denotes a priority document submitted or transmitted to the International Bureau but not in compliance with Rule 17.1(a) or (b) (the priority document was received after the time limit prescribed in Rule 17.1(a) or the request to prepare and transmit the priority document was submitted to the receiving Office after the applicable time limit under Rule 17.1(b)). Even though the priority document was not furnished in compliance with Rule 17.1(a) or (b), the International Bureau will nevertheless transmit a copy of the document to the designated Offices, for their consideration. In case such a copy is not accepted by the designated Office as the priority document, Rule 17.1(c) provides that no designated Office may disregard the priority claim concerned before giving the applicant an opportunity, upon entry into the national phase, to furnish the priority document within a time limit which is reasonable under the circumstances.

Priority date	Priority application No.	Country or regional Office or PCT receiving Office	Date of receipt of priority document
10 June 2005 (10.06.2005)	695/MUM/2005	IN	05 March 2007 (05.03.2007)

The International Bureau of WIPO
34, chemin des Colombettes
1211 Geneva 20, Switzerland

Facsimile No. +41 22 338 82 70

Authorized officer

Dorothee Mülhausen

Facsimile No. +41 22 338 82 70

Telephone No. +41 22 338 96 72

PATENT COOPERATION TREATY

66

From the:
INTERNATIONAL SEARCHING AUTHORITY

PCT

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43bis.1)

To:

**WATERMARK PATENT & TRADEMARK
ATTORNEYS**
Level 21 Affendale Square
77 St Georges Terrace
PERTH W.A. 6000

Date of mailing **10 MAY 2007**
(day/month/year)

Applicant's or agent's file reference
KM-026

FOR FURTHER ACTION
See paragraph 2 below

International application No.
PCT/IN2006/000201

International filing date (day/month/year)
9 June 2006

Priority date (day/month/year)
10 June 2005

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

INT. CL.

B60G 11/14 (2006.01) B60G 15/07 (2006.01) F16F 9/00 (2006.01)
B60G 11/56 (2006.01) F16F 7/00 (2006.01)

Applicant
BAJAJ AUTO LIMITED et al

1. This opinion contains indications relating to the following items:

☒ Box No. I	Basis of the opinion
☐ Box No. II	Priority
☐ Box No. III	Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
☒ Box No. IV	Lack of unity of invention
☒ Box No. V	Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
☐ Box No. VI	Certain documents cited
☐ Box No. VII	Certain defects in the international application
☒ Box No. VIII	Certain observations on the international application
2. **FURTHER ACTION**

If a demand for international preliminary examination is made, this opinion will be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1bis(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.
3. For further details, see notes to Form PCT/ISA/220.

Name and mailing address of the ISA AUSTRALIAN PATENT OFFICE PO BOX 200, WODEN ACT 2606, AUSTRALIA E-mail address: pct@ipaaustralia.gov.au Facsimile No. (02) 6285 3929	Date of completion of this opinion 07 May 2007	Authorized Officer B. NGUYEN AUSTRALIAN PATENT OFFICE (ISO 9001 Quality Certified Service) Telephone No. (02) 6283 2306
--	--	--

66

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

International application No.

PCT/IN2006/000201

Box No. I Basis of this opinion

1. With regard to the language, this opinion has been established on the basis of:
 - ☒ The international application in the language in which it was filed
 - ☐ A translation of the international application into, _____, which is the language of a translation furnished for the purposes of international search (under Rules 12.3(a) and 23.1(b)).
2. ☐ This opinion has been established taking into account the rectification of an obvious mistake authorized by or notified to this Authority under Rule 91 (Rule 43bis.1(a)).
3. With regard to any nucleotide and/or amino acid sequence disclosed in the international application, this opinion has been established on the basis of:
 - a. type of material
 - ☐ a sequence listing
 - ☐ table(s) related to the sequence listing
 - b. format of material
 - ☐ on paper
 - ☐ in electronic form
 - c. time of filing/furnishing
 - ☐ contained in the international application as filed.
 - ☐ filed together with the international application in electronic form.
 - ☐ furnished subsequently to this Authority for the purposes of search.
4. ☐ In addition, in the case that more than one version or copy of a sequence listing and/or table(s) relating thereto has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.
5. Additional comments:

52

**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY**

International application No.

PCT/IN2006/000201

Box No. IV Lack of unity of invention

1. ☒ In response to the invitation (Form PCT/ISA/206) to pay additional fees the applicant has, within the applicable time limit:
- ☐ paid additional fees
- ☐ paid additional fees under protest and, where applicable, the protest fee
- ☐ paid additional fees under protest but the applicable protest fee was not paid
- ☒ not paid additional fees
2. ☐ This Authority found that the requirement of unity of invention is not complied with and chose not to invite the applicant to pay additional fees.
3. This Authority considers that the requirement of unity of invention in accordance with Rule 13.1, 13.2 and 13.3 is
- ☐ complied with
- ☒ not complied with for the following reasons:

The different inventions are:

1. Claims 1 to 17 are directed to a shock absorber, or a vehicle with a shock absorber, comprising a spring combination having first and second spring elements which are operatively disposed to share load due to road induced vibrations during the motion of the vehicle. It is considered that a shock absorber with these features comprises a first inventive concept and a first set of distinguishing features. Claim 18 is directed to a method of designing a motorcycle wherein the selection of the shock absorber as defined in claims 1 to 13 over a shock absorber with a single spring provides space for routing a silencer. While claim 18 is directed to a second inventive concept of routing a silencer in designing a motorcycle, the design method inherently follows from the shock absorber of claims 1 to 13. Consequently, claim 18 is inherently covered by the search of claims 1 to 17.

2. Claims 19 and 20 are directed to a third inventive concept being a method of fabricating a motorcycle component wherein the component is fabricated with a configuration independent of the design parameters of a shock absorber mounted proximate to the component. *There is no claimed limitation on the proximate component which thus includes such a conventional component as the motorcycle rear wheel.* Consequently, claims 19 and 20 are so unsupported by the description that a meaningful search could not be carried out. Claim 20 places no further meaningful limitation on claim 19, in that claim 20 specifies one particular design parameter whereas claim 19 requires independence of all design parameters. As well as being directed to a different inventive concept, claims 19 and 20 also do not share any potentially distinguishing features with any of claims 1 to 18.

Each of the abovementioned groups of claims has a different distinguishing feature and they do not share any feature which could satisfy the requirement for being a special technical feature. Because there is no common special technical feature it follows that there is no technical relationship between the identified inventions. Therefore the claims do not satisfy the requirement of unity of invention *a priori*.

4. Consequently, this opinion has been established in respect of the following parts of the international application:
- ☐ all parts
- ☒ the parts relating to claims Nos. 1 – 18, 21

**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY**

International application No.

PCT/TN2006/000201

Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims 13	YES
	Claims 1 - 12, 14 - 18, 21	NO
Inventive step (IS)	Claims 13	YES
	Claims 1 - 12, 14 - 18, 21	NO
Industrial applicability (IA)	Claims 1 - 18, 21	YES
	Claims	NO

2. Citations and explanations:

The following documents identified in the International Search Report have been considered for the purposes of this report:

D1 US 4126302
D2 US 6691991
D3 US 3856285
D4 US 2010623

NOVELTY (N) : Claims 1 - 12, 14 - 18, 21

Document D1 discloses all the features as defined in claims 1 - 12, 14 - 18, 21. See the comparison of claim 1 against the citation:

D1 discloses a shock absorber comprising a spring combination having first and second spring elements (34,40) having capacity to store energy from vehicle vibrations, the first and second spring elements being operatively disposed to share load due to road induced vibrations during the motion of the vehicle.

Features as defined in claims 2 to 11 are also anticipated in D1.

D1 also discloses features as claimed in claims 14 to 18

Similarly document D2 discloses all the features as defined in claims 1 - 7, 9 - 12, 14 - 18, 21. With reference to claim 12, D2 discloses adjustment means such as stopping member (36) or nut and washer (28) for adjusting the pre-compression of the spring elements (40,50).

INVENTIVE STEP (IS) : Claims 1 - 12, 14 - 18, 21

These claims are considered not to involve an inventive step for the reasons as stated above.

INDUSTRIAL APPLICABILITY (IA) : Claims 1 - 18, 21

These claims are considered to be industrially applicable.

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

International application No.

PCT/IN2006/000201

Box No. VIII Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:

1. Claim 1 lacks clarity in its reference to "said first and second spring elements being operatively disposed to share load" as it leaves doubt in reader's mind with regard to the arrangement of the first and the second spring elements whether they are side by side to each other or one spring is inside the another or they are connected end to end.
2. Claim 12 lacks clarity as it purports to be a dependent claim but at its present form it is an independent claim.

PATENT COÖPERATION TREATY

RHB - 2012

71

P28 517 PCT

From: INTERNATIONAL PRELIMINARY EXAMINING AUTHORITY

To:

WATERMARK PATENT & TRADEMARK
ATTORNEYS
Level 21 Allendale Square
77 St Georges Terrace
PERTH W.A. 6000

WATERMARK
PERTH

REC'D 11 OCT 2007

PCT

NOTIFICATION OF TRANSMITTAL OF
INTERNATIONAL PRELIMINARY
REPORT ON PATENTABILITY
(Chapter II of the Patent Cooperation Treaty)

(PCT Rule 71.1)

Date of mailing 15 OCT 2007
(day/month/year)

Applicant's or agent's file reference
DM-026

IMPORTANT NOTIFICATION

International application No.
PCT/IN2006/000201

International filing date (day/month/year)
9 June 2006

Priority date (day/month/year)
10 June 2005

Applicant

BAJAJ AUTO LIMITED et al

1. The applicant is hereby notified that this International Preliminary Examining Authority transmits herewith the international preliminary report on patentability and its annexes, if any, established on the international application.
2. A copy of the report and its annexes, if any, is being transmitted to the International Bureau for communication to all the elected Offices.
3. Where required by any of the elected Offices, the International Bureau will prepare an English translation of the report (but not of any annexes) and will transmit such translations to those Offices.
4. **REMINDER**

The applicant must enter the national phase before each elected Office by performing certain acts (filing translations and paying national fees) within 30 months from the priority date (or later in some Offices) (Article 39(1)) (see also the reminder sent by the International Bureau with Form PCT/IB/301).

Where a translation of the international application must be furnished to an elected Office, that translation must contain a translation of any annexes to the international preliminary report on patentability. It is the applicant's responsibility to prepare and furnish such translation directly to each elected Office concerned.

For further details on the applicable time limits and requirements of the elected Offices, see Volume II of the *PCT Applicant's Guide*.

The applicant's attention is drawn to Article 33(5), which provides that the criteria of novelty, inventive step and industrial applicability described in Article 33(2) to (4) merely serve the purposes of international preliminary examination and that "any Contracting State may apply additional or different criteria for the purposes of deciding whether, in that State, the claimed invention is patentable or not" (see also Article 27(5)). Such additional criteria may relate, for example, to exemptions from patentability, requirements for enabling disclosure, clarity and support for the claims.

Name and mailing address of the IPEA/AU

AUSTRALIAN PATENT OFFICE
PO BOX 200, WODEN ACT 2606, AUSTRALIA
E-mail address: pct@ipaustalia.gov.au
Facsimile No. (02) 6285 3929

Authorized officer

B. NGUYEN
AUSTRALIAN PATENT OFFICE
(ISO 9001 Quality Certified Service)
Telephone No. (02) 6283 2306

71

PATENT COÖPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference DM-026	FOR FURTHER ACTION		See Form PCT/IPEA/416
International application No. PCT/IN2006/000201	International filing date (day/month/year) 9 June 2006	Priority date (day/month/year) 10 June 2005	
International Patent Classification (IPC) or national classification and IPC Int. Cl. B60G 11/14 (2006.01) B60G 15/07 (2006.01) F16F 9/00 (2006.01) B60G 11/56 (2006.01) F16F 7/00 (2006.01)			
Applicant BAJAJ AUTO LIMITED et al			

1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.
2. This REPORT consists of a total of **5** sheets, including this cover sheet.
3. This report is also accompanied by ANNEXES, comprising:
 - a. ☐ (sent to the applicant and to the International Bureau) a total of sheets, as follows:
 - ☐ sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions).
 - ☐ sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box.
 - b. ☐ (sent to the International Bureau only) a total of (indicate type and number of electronic carrier(s)) , containing a sequence listing and/or table related thereto, in electronic form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).

4. This report contains indications relating to the following items:

☒ Box No. I	Basis of the report
☐ Box No. II	Priority
☐ Box No. III	Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
☒ Box No. IV	Lack of unity of invention
☒ Box No. V	Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
☐ Box No. VI	Certain documents cited
☐ Box No. VII	Certain defects in the international application
☒ Box No. VIII	Certain observations on the international application

Date of submission of the demand 10 April 2007	Date of completion of this report 10 October 2007
Name and mailing address of the IPEA/AU AUSTRALIAN PATENT OFFICE PO BOX 200, WODEN ACT 2606, AUSTRALIA E-mail address: pct@ipaustalia.gov.au Facsimile No. (02) 6285 3929	Authorized Officer B. NGUYEN AUSTRALIAN PATENT OFFICE (ISO 9001 Quality Certified Service) Telephone No. (02) 6283 2306

Box No. 1 Basis of the report

- With regard to the language, this report is based on:
- ☒ The international application in the language in which it was filed
- ☐ A translation of the international application into _____, which is the language of a translation furnished for the purposes of:
- ☐ international search (under Rules 12.3(a) and 23.1 (b))
- ☐ publication of the international application (under Rule 12.4(a))
- ☐ international preliminary examination (Rules 55.2(a) and/or 55.3(a))
2. With regard to the elements of the international application, this report is based on *(replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report)*:
- ☒ the international application as originally filed/furnished
- ☐ the description:
- pages as originally filed/furnished
- pages* received by this Authority on _____ with the letter of _____
- pages* received by this Authority on _____ with the letter of _____
- ☐ the claims:
- pages as originally filed/furnished
- pages* as amended (together with any statement) under Article 19
- pages* received by this Authority on _____ with the letter of _____
- pages* received by this Authority on _____ with the letter of _____
- ☐ the drawings:
- pages as originally filed/furnished
- pages* received by this Authority on _____ with the letter of _____
- pages* received by this Authority on _____ with the letter of _____
- ☐ a sequence listing and/or any related table(s) - see Supplemental Box Relating to Sequence Listing.
3. ☐ The amendments have resulted in the cancellation of:
- ☐ the description, pages _____
- ☐ the claims, Nos. _____
- ☐ the drawings, sheets/figs _____
- ☐ the sequence listing (specify): _____
- ☐ any table(s) related to the sequence listing (specify): _____
4. ☐ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).
- ☐ the description, pages _____
- ☐ the claims, Nos. _____
- ☐ the drawings, sheets/figs _____
- ☐ the sequence listing (specify): _____
- ☐ any table(s) related to the sequence listing (specify): _____
5. ☐ This report has been established taking into account the rectification of an obvious mistake authorized by or notified to the Authority under Rule 91 (Rule 70.2(e)).

* If item 4 applies, some or all of those sheets may be marked "superseded."

Box No. IV Lack of unity of invention

1. ☒ In response to the invitation to restrict or pay additional fees the applicant has, within the applicable time limit:
- ☐ restricted the claims
 - ☐ paid additional fees
 - ☐ paid additional fees under protest and, where applicable, the protest fee
 - ☐ paid additional fees under protest but the applicable protest fee was not paid
 - ☒ neither restricted the claims nor paid additional fees
2. ☐ This Authority found that the requirement of unity of invention is not complied with and chose, according to Rule 68.1, not to invite the applicant to restrict or pay additional fees.
3. This Authority considers that the requirement of unity of invention in accordance with Rules 13.1, 13.2 and 13.3 is:
- ☐ complied with.
 - ☒ not complied with for the following reasons:
 - 1. Claims 1 to 17 are directed to a shock absorber, or a vehicle with a shock absorber, comprising a spring combination having first and second spring elements which are operatively disposed to share load due to road induced vibrations during the motion of the vehicle. It is considered that a shock absorber with these features comprises a first inventive concept and a first set of distinguishing features. Claim 18 is directed to a method of designing a motorcycle wherein the selection of the shock absorber as defined in claims 1 to 13 over a shock absorber with a single spring provides space for routing a silencer. While claim 18 is directed to a second inventive concept of routing a silencer in designing a motorcycle, the design method inherently follows from the shock absorber of claims 1 to 13. Consequently, claim 18 is inherently covered by the search of claims 1 to 17.
 - 2. Claims 19 and 20 are directed to a third inventive concept being a method of fabricating a motorcycle component wherein the component is fabricated with a configuration independent of the design parameters of a shock absorber mounted proximate to the component. There is no claimed limitation on the proximate component which thus includes such a conventional component as the motorcycle rear wheel. Consequently, claims 19 and 20 are so unsupported by the description that a meaningful search could not be carried out. Claim 20 places no further meaningful limitation on claim 19, in that claim 20 specifies one particular design parameter whereas claim 19 requires independence of all design parameters. As well as being directed to a different inventive concept, claims 19 and 20 also do not share any potentially distinguishing features with any of claims 1 to 18. Each of the abovementioned groups of claims has a different distinguishing feature and they do not share any feature which could satisfy the requirement for being a special technical feature. Because there is no common special technical feature it follows that there is no technical relationship between the identified inventions. Therefore the claims do not satisfy the requirement of unity of invention *a priori*.
4. Consequently, this report has been established in respect of the following parts of the international application:
- ☐ all parts.
 - ☒ the parts relating to claims Nos. 1 - 18, 21

28

Box No. V

Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims 13	YES
	Claims 1 - 12, 14 - 18, 21	NO
Inventive step (IS)	Claims 13	YES
	Claims 1 - 12, 14 - 18, 21	NO
Industrial applicability (IA)	Claims 1 - 18, 21	YES
	Claims	NO

2. Citations and explanations (Rule 70.7)

The following documents identified in the International Search Report have been considered for the purposes of this report:

D1 US 4126302
 D2 US 6691991
 D3 US 3856285
 D4 US 2010623

NOVELTY (N) : Claims 1 - 12, 14 - 18, 21

Document D1 discloses all the features as defined in claims 1 - 12, 14 - 18, 21. See the comparison of claim 1 against the citation:

D1 discloses a shock absorber comprising a spring combination having first and second spring elements (34,40) having capacity to store energy from vehicle vibrations, the first and second spring elements being operatively disposed to share load due to road induced vibrations during the motion of the vehicle.

Features as defined in claims 2 to 11 are also anticipated in D1.

D1 also discloses features as claimed in claims 14 to 18

Similarly document D2 discloses all the features as defined in claims 1 - 7, 9 - 12, 14 - 18, 21. With reference to claim 12, D2 discloses adjustment means such as stopping member (36) or nut and washer (28) for adjusting the pre-compression of the spring elements (40,50).

INVENTIVE STEP (IS) : Claims 1 - 12, 14 - 18, 21

These claims are considered not to involve an inventive step for the reasons as stated above.

INDUSTRIAL APPLICABILITY (IA) : Claims 1 - 18, 21

These claims are considered to be industrially applicable.

75

Box No. VIII Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:

1. Claim 1 lacks clarity in its reference to "said first and second spring elements being operatively disposed to share load" as it leaves doubt in reader's mind with regard to the arrangement of the first and the second spring elements whether they are side by side to each other or one spring is inside the another or they are connected end to end.
2. Claim 12 lacks clarity as it purports to be a dependent claim but at its present form it is an independent claim.

PATENT COOPERATION TREATY

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference KM-026	FOR FURTHER ACTION		see Form PCT/ISA/220 as well as, where applicable, item 5 below.
International application No. PCT/IN2006/000201	International filing date (day/month/year) 9 June 2006	(Earliest) Priority Date (day/month/year) 10 June 2005	
Applicant BAJAJ AUTO LIMITED et al			
This international search report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau. This international search report consists of a total of 5 sheets. ☐ It is also accompanied by a copy of each prior art document cited in this report.			
1. Basis of the report a. With regard to the language, the international search was carried out on the basis of: ☒ The international application in the language in which it was filed. ☐ A translation of the international application into _____, which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b)). b. ☐ This international search report has been established taking into account the rectification of an obvious mistake authorized by or notified to this Authority under Rule 91 (Rule 43.6bis(a)). c. ☐ With regard to any nucleotide and/or amino acid sequence disclosed in the international application, see Box No. I. 2. ☐ Certain claims were found unsearchable (See Box No. II). 3. ☒ Unity of invention is lacking (See Box No. III). 4. With regard to the title, ☒ the text is approved as submitted by the applicant. ☐ the text has been established by this Authority to read as follows: 5. With regard to the abstract, ☒ the text is approved as submitted by the applicant. ☐ the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box No. IV. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority. 6. With regard to the drawings, a. the figure of the drawings to be published with the abstract is Figure No. 1 ☐ as suggested by the applicant. ☒ as selected by this Authority, because the applicant failed to suggest a figure. ☐ as selected by this Authority, because this figure better characterizes the invention. b. ☐ none of the figures is to be published with the abstract.			

Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:
2. ☐ Claims Nos.:
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:
3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a)

Box No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

1. Claims 1 – 17, 18: A shock absorber comprising a spring combination having first and second spring elements having capacity to store energy from vehicle vibrations.
2. Claims 19, 20: A method of fabricating a motorcycle component

as reasoned on the extra sheet

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying additional fees, this Authority did not invite payment of additional fees.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☒ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.: 1 – 18, 21

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.
- ☐ The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.
- ☐ No protest accompanied the payment of additional search fees.

INTERNATIONAL SEARCH REPORT

International application No.

PCT/IN2006/000201

A. CLASSIFICATION OF SUBJECT MATTER

Int. Cl.

B60G 11/14 (2006.01)

B60G 15/07 (2006.01)

F16F 9/00 (2006.01)

B60G 11/56 (2006.01)

F16F 7/00 (2006.01)

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)

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)

DWPI IPC B60G 15/-, 17/-, B62K 25/-, F16F 7/-, 9/- & keywords: spring, coil, two, dual, second, twin, combination, addition, auxiliary, plus, supplement, double, cycle, bike or similar terms.

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 4126302 A (CURNUTT) 21 November 1978 Whole document	1-12, 14-18, 21
X	US 6691991 B1 (HUANG) 17 February 2004 Whole document	1-7, 9-12, 14-18, 21
X	US 3856285 A (YAMADA) 24 December 1974 See fig. 14	1-7, 9-12, 14-18, 21
X	US 2010623 A (BUGATTI) 6 August 1935 Whole document	1-7, 9-12, 14-18, 21



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	"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
"B" earlier application or patent but published on or after the international filing date	"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
"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)	"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
"O" document referring to an oral disclosure, use, exhibition or other means	"&" document member of the same patent family
"P" document published prior to the international filing date but later than the priority date claimed	

Date of the actual completion of the international search
07 May 2007

Date of mailing of the international search report

10 MAY 2007

Name and mailing address of the ISA/AU

AUSTRALIAN PATENT OFFICE
PO BOX 200, WODEN ACT 2606, AUSTRALIA
E-mail address: pct@ipaustalia.gov.au
Facsimile No. (02) 6285 3929

Authorized officer

B. NGUYEN
AUSTRALIAN PATENT OFFICE
(ISO 9001 Quality Certified Service)
Telephone No. : (02) 6283 2306

Supplemental Box

(To be used when the space in any of Boxes I to VIII is not sufficient)

Continuation of Box No: III

The different inventions are:

1. Claims 1 to 17 are directed to a shock absorber, or a vehicle with a shock absorber, comprising a spring combination having first and second spring elements which are operatively disposed to share load due to road induced vibrations during the motion of the vehicle. It is considered that a shock absorber with these features comprises a first inventive concept and a first set of distinguishing features. Claim 18 is directed to a method of designing a motorcycle wherein the selection of the shock absorber as defined in claims 1 to 13 over a shock absorber with a single spring provides space for routing a silencer. While claim 18 is directed to a second inventive concept of routing a silencer in designing a motorcycle, the design method inherently follows from the shock absorber of claims 1 to 13. Consequently, claim 18 is inherently covered by the search of claims 1 to 17.
2. Claims 19 and 20 are directed to a third inventive concept being a method of fabricating a motorcycle component wherein the component is fabricated with a configuration independent of the design parameters of a shock absorber mounted proximate to the component. There is no claimed limitation on the proximate component which thus includes such a conventional component as the motorcycle rear wheel. Consequently, claims 19 and 20 are so unsupported by the description that a meaningful search could not be carried out. Claim 20 places no further meaningful limitation on claim 19, in that claim 20 specifies one particular design parameter whereas claim 19 requires independence of all design parameters. As well as being directed to a different inventive concept, claims 19 and 20 also do not share any potentially distinguishing features with any of claims 1 to 18.

PCT Rule 13.2, first sentence, states that unity of invention is only fulfilled when there is a technical relationship among the claimed inventions involving one or more of the same or corresponding special technical features. PCT Rule 13.2, second sentence, defines a special technical feature as a feature which makes a contribution over the prior art.

Each of the abovementioned groups of claims has a different distinguishing feature and they do not share any feature which could satisfy the requirement for being a special technical feature. Because there is no common special technical feature it follows that there is no technical relationship between the identified inventions. Therefore the claims do not satisfy the requirement of unity of invention *a priori*.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/IN2006/000201

This Annex lists the known "A" publication level patent family members relating to the patent documents cited in the above-mentioned international search report. The Australian Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

Patent Document Cited in Search Report		Patent Family Member	
US	4126302		
US	6691991		
US	3856285	JP	49012282
US	2010623	BE	398329
		FR	741637
Due to data integration issues this family listing may not include 10 digit Australian applications filed since May 2001.			
END OF ANNEX			

PCT

REQUEST

The undersigned requests that the present international application be processed according to the Patent Cooperation Treaty.

For receiving Office use only

International Application No.

International Filing Date

Name of receiving Office and "PCT International Application"

Applicant's or agent's file reference
(if desired) (12 characters maximum) KM-026

Box No. I TITLE OF INVENTION
A shock absorber for a motor vehicle

Box No. II APPLICANT

☐ This person is also inventor

Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this box is the applicant's State (that is, country) of residence if no State of residence is indicated below.)

Bajaj Auto Limited
Akurdi
Pune 411 035
Maharashtra, India

Telephone No.
(91) (020) 27472851

Facsimile No.
(91) (020) 27407387

Teleprinter No.

Applicant's registration No. with the Office

State (that is, country) of nationality:

IN

State (that is, country) of residence:

IN

This person is applicant for the purposes of:

☐ all designated States

☒ all designated States except the United States of America

☐ the United States of America only

☐ the States indicated in the Supplemental Box

Box No. III FURTHER APPLICANT(S) AND/OR (FURTHER) INVENTOR(S)

Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this box is the applicant's State (that is, country) of residence if no State of residence is indicated below.)

Abraham Joseph
of Bajaj Auto Limited, Akurdi, Pune 411 035,
Maharashtra, India

This person is:

☐ applicant only

☒ applicant and inventor

☐ inventor only (if this check-box is marked, do not fill in below)

Applicant's registration No. with the Office

State (that is, country) of nationality:

IN

State (that is, country) of residence:

IN

This person is applicant for the purposes of:

☐ all designated States

☐ all designated States except the United States of America

☒ the United States of America only

☐ the States indicated in the Supplemental Box

☐ Further applicants and/or (further) inventors are indicated on a continuation sheet.

Box No. IV AGENT OR COMMON REPRESENTATIVE; OR ADDRESS FOR CORRESPONDENCE

The person identified below is hereby/has been appointed to act on behalf of the applicant(s) before the competent International Authorities as:

☐ agent

☐ common representative

Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country.)

Madan Jose A, Jhunjhunwala Ram N, Grover Vivek,
Dwarkanadas Vinay D, Dr Gharve Shilpa, Jhunjhunwala
Rabindranath and Madan Prita, all of Khaitan & Co,
Advocates, Notaries, Patent & Trade Mark Attorneys,
Meher Chambers, 4th & 5th Floors, R K Marg, Ballard
Estate, Mumbai 400038, Maharashtra, India

Telephone No.
(91) (22) 66365000

Facsimile No.
(91) (22) 66365050

Teleprinter No.

Agent's registration No. with the Office

☐ Address for correspondence: Mark this check-box where no agent or common representative is/has been appointed and the space above is used instead to indicate a special address to which correspondence should be sent.

Box No. V DESIGNATIONS

The filing of this request constitutes under Rule 4.9(a), the designation of all Contracting States bound by the PCT on the international filing date, for the grant of every kind of protection available and, where applicable, for the grant of both regional and national patents. However,

- ☐ DE Germany is not designated for any kind of national protection
- ☐ KR Republic of Korea is not designated for any kind of national protection
- ☐ RU Russian Federation is not designated for any kind of national protection

(The check-boxes above may be used to exclude (irrevocably) the designations concerned in order to avoid the ceasing of the effect, under the national law, of an earlier national application from which priority is claimed. See the Notes to Box No. V as to the consequences of such national law provisions in these and certain other States.)

Box No. VI PRIORITY CLAIM

The priority of the following earlier application(s) is hereby claimed:

Filing date of earlier application (day/month/year)	Number of earlier application	Where earlier application is:		
		national application: country or Member of WTO	regional application: * regional Office	international application: receiving Office
item (1) 10/08/2005	695/MUM/2005	India	Mumbai	Mumbai
item (2)				
item (3)				

- ☐ Further priority claims are indicated in the Supplemental Box.

The receiving Office is requested to prepare and transmit to the International Bureau a certified copy of the earlier application(s) (only if the earlier application was filed with the Office which for the purposes of this international application is the receiving Office) identified above as:

- ☐ all items ☒ item (1) ☐ item (2) ☐ item (3) ☐ other, see Supplemental Box

* Where the earlier application is an ARIPO application, indicate at least one country party to the Paris Convention for the Protection of Industrial Property or one Member of the World Trade Organization for which that earlier application was filed (Rule 4.10(b)(ii)).

Box No. VII INTERNATIONAL SEARCHING AUTHORITY

Choice of International Searching Authority (ISA) (if two or more International Searching Authorities are competent to carry out the international search, indicate the Authority chosen; the two-letter code may be used):

ISA / AU

Request to use results of earlier search; reference to that search (if an earlier search has been carried out by or requested from the International Searching Authority):

Date (day/month/year) Number Country (or regional Office)

Box No. VIII DECLARATIONS

The following declarations are contained in Boxes Nos. VIII (i) to (v) (mark the applicable check-boxes below and indicate in the right column the number of each type of declaration):

Number of declarations

- ☐ Box No. VIII (i) Declaration as to the identity of the inventor :
- ☒ Box No. VIII (ii) Declaration as to the applicant's entitlement, as at the international filing date, to apply for and be granted a patent :
- ☐ Box No. VIII (iii) Declaration as to the applicant's entitlement, as at the international filing date, to claim the priority of the earlier application :
- ☒ Box No. VIII (iv) Declaration of inventorship (only for the purposes of the designation of the United States of America) :
- ☐ Box No. VIII (v) Declaration as to non-prejudicial disclosures or exceptions to lack of novelty :

Box No. VIII (i) DECLARATION: ENTITLEMENT TO APPLY FOR AND BE GRANTED A PATENT

The declaration must conform to the standardized wording provided for in Section 212; see Notes to Boxes Nos. VIII, VIII (i) to (iv) (in general) and the specific Notes to Box No. VIII (i). If this Box is not used, this sheet should not be included in the request.

Declaration as to the applicant's entitlement, as at the international filing date, to apply for and be granted a patent (Rules 4.17(ii) and 51bis.1(a)(ii)), in a case where the declaration under Rule 4.17(iv) is not appropriate:

In relation to this International Application, Bajaj Auto Limited, is entitled to apply for and be granted a patent by virtue of the following :

- i) an Assignment from Abraham Joseph to Bajaj Auto Limited dated 9th June 2005
- ii) this Declaration is made for purpose of all designations (except the designation of the United States of America)

☐ This declaration is continued on the following sheet, "Continuation of Box No. VIII (i)".

Box No. VIII (iv) DECLARATION: INVENTORSHIP (only for the purposes of the designation of the United States of America)
The declaration must conform to the following standardized wording provided for in Section 214; see Notes to Boxes Nos. VIII, VIII (i) to (iv) (in general) and the specific Notes to Box No. VIII (iv). If this Box is not used, this sheet should not be included in the request.

**Declaration of inventorship (Rules 4.17(iv) and 516a.1(a)(iv))
 for the purposes of the designation of the United States of America:**

I hereby declare that I believe I am the original, first and sole (if only one inventor is listed below) or joint (if more than one inventor is listed below) inventor of the subject matter which is claimed and for which a patent is sought.

This declaration is directed to the international application of which it forms a part (if filing declaration with application).

This declaration is directed to international application No. PCT/..... (if furnishing declaration pursuant to Rule 26ter).

I hereby declare that my residence, mailing address, and citizenship are as stated next to my name.

I hereby state that I have reviewed and understand the contents of the above-identified international application, including the claims of said application. I have identified in the request of said application, in compliance with PCT Rule 4.10, any claim to foreign priority, and I have identified below, under the heading "Prior Applications," by application number, country or Member of the World Trade Organization, day, month and year of filing, any application for a patent or inventor's certificate filed in a country other than the United States of America, including any PCT international application designating at least one country other than the United States of America, having a filing date before that of the application on which foreign priority is claimed.

Prior Applications:

I hereby acknowledge the duty to disclose information that is known by me to be material to patentability as defined by 37 C.F.R. § 1.56, including for continuation-in-part applications, material information which became available between the filing date of the prior application and the PCT international filing date of the continuation-in-part application.

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

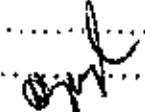
Name: Abraham Joseph

Residence: India

(city and either US state, if applicable, or country)

Mailing Address: Bajaj Auto Limited, Akurdi, Pune 411025, Maharashtra, India.

Citizenship: Indian

Inventor's Signature: 
 (if not contained in the request, or if declaration is corrected or added under Rule 26ter after the filing of the international application. The signature must be that of the inventor, not that of the agent)

Date: 9.10.2006
 (of signature which is not contained in the request, or of the declaration that is corrected or added under Rule 26ter after the filing of the international application)

Name:

Residence:

(city and either US state, if applicable, or country)

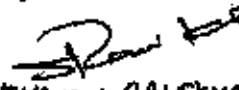
Mailing Address:

Citizenship:

Inventor's Signature:
 (if not contained in the request, or if declaration is corrected or added under Rule 26ter after the filing of the international application. The signature must be that of the inventor, not that of the agent)

Date:
 (of signature which is not contained in the request, or of the declaration that is corrected or added under Rule 26ter after the filing of the international application)

☐ This declaration is continued on the following sheet, "Continuation of Box No. VIII (iv)".

Box No. IX CHECK LIST; LANGUAGE OF FILING																																																																								
This international application contains: (a) on paper, the following number of sheets: <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 80%;">request (including declaration sheets)</td> <td style="width: 20%; text-align: right;">5</td> </tr> <tr> <td>description (excluding sequence listing and/or tables related thereto)</td> <td style="text-align: right;">10</td> </tr> <tr> <td>claims</td> <td style="text-align: right;">3</td> </tr> <tr> <td>abstract</td> <td style="text-align: right;">1</td> </tr> <tr> <td>drawings</td> <td style="text-align: right;">8</td> </tr> <tr> <td>Sub-total number of sheets</td> <td style="text-align: right; border-top: 1px solid black;">27</td> </tr> <tr> <td>sequence listing</td> <td></td> </tr> <tr> <td>tables related thereto</td> <td></td> </tr> <tr> <td colspan="2"><i>(for both, actual number of sheets if filed on paper, whether or not also filed in electronic form; see (b) below)</i></td> </tr> <tr> <td>Total number of sheets</td> <td style="text-align: right; border-top: 1px solid black;">27</td> </tr> </table> (b) ☐ only in electronic form (Section 801(a)(i)) (i) ☐ sequence listing (ii) ☐ tables related thereto (c) ☐ also in electronic form (Section 801(a)(ii)) (i) ☐ sequence listing (ii) ☐ tables related thereto Type and number of carriers (discette, CD-ROM, CD-R or other) on which are contained the ☐ sequence listing ☐ tables related thereto <i>(additional copies to be indicated under items 9(ii) and/or 10(ii), in right column)</i>	request (including declaration sheets)	5	description (excluding sequence listing and/or tables related thereto)	10	claims	3	abstract	1	drawings	8	Sub-total number of sheets	27	sequence listing		tables related thereto		<i>(for both, actual number of sheets if filed on paper, whether or not also filed in electronic form; see (b) below)</i>		Total number of sheets	27	This international application is accompanied by the following item(s) (mark the applicable check-boxes below and indicate in right column the number of each item): <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 5%;">1. ☐</td> <td style="width: 85%;">fee calculation sheet</td> <td style="width: 10%; text-align: right;">:</td> </tr> <tr> <td>2. ☒</td> <td>original separate power of attorney</td> <td style="text-align: right;">:</td> </tr> <tr> <td>3. ☐</td> <td>original general power of attorney</td> <td style="text-align: right;">:</td> </tr> <tr> <td>4. ☐</td> <td>copy of general power of attorney; reference number, if any:</td> <td style="text-align: right;">:</td> </tr> <tr> <td>5. ☐</td> <td>statement explaining lack of signature</td> <td style="text-align: right;">:</td> </tr> <tr> <td>6. ☐</td> <td>priority document(s) identified in Box No. VI as item(s):</td> <td style="text-align: right;">:</td> </tr> <tr> <td>7. ☐</td> <td>translation of international application into (language):</td> <td style="text-align: right;">:</td> </tr> <tr> <td>8. ☐</td> <td>separate indications concerning deposited microorganism or other biological material</td> <td style="text-align: right;">:</td> </tr> <tr> <td>9. ☐</td> <td>sequence listing in electronic form (indicate type and number of carriers)</td> <td style="text-align: right;">:</td> </tr> <tr> <td style="padding-left: 10px;">(i) ☐</td> <td>copy submitted for the purposes of international search under Rule 13ter only (and not as part of the international application)</td> <td style="text-align: right;">:</td> </tr> <tr> <td style="padding-left: 10px;">(ii) ☐</td> <td>(only where check-box (b)(i) or (c)(i) is marked in left column) additional copies including, where applicable, the copy for the purposes of international search under Rule 13ter</td> <td style="text-align: right;">:</td> </tr> <tr> <td style="padding-left: 10px;">(iii) ☐</td> <td>together with relevant statement as to the identity of the copy or copies with the sequence listing mentioned in left column</td> <td style="text-align: right;">:</td> </tr> <tr> <td>10. ☐</td> <td>tables in electronic form related to sequence listing (indicate type and number of carriers)</td> <td style="text-align: right;">:</td> </tr> <tr> <td style="padding-left: 10px;">(i) ☐</td> <td>copy submitted for the purposes of international search under Section 802(b-quater) only (and not as part of the international application)</td> <td style="text-align: right;">:</td> </tr> <tr> <td style="padding-left: 10px;">(ii) ☐</td> <td>(only where check-box (b)(ii) or (c)(ii) is marked in left column) additional copies including, where applicable, the copy for the purposes of international search under Section 802(b-quater)</td> <td style="text-align: right;">:</td> </tr> <tr> <td style="padding-left: 10px;">(iii) ☐</td> <td>together with relevant statement as to the identity of the copy or copies with the tables mentioned in left column</td> <td style="text-align: right;">:</td> </tr> <tr> <td>11. ☐</td> <td>other (specify):</td> <td style="text-align: right;">:</td> </tr> </table>	1. ☐	fee calculation sheet	:	2. ☒	original separate power of attorney	:	3. ☐	original general power of attorney	:	4. ☐	copy of general power of attorney; reference number, if any:	:	5. ☐	statement explaining lack of signature	:	6. ☐	priority document(s) identified in Box No. VI as item(s):	:	7. ☐	translation of international application into (language):	:	8. ☐	separate indications concerning deposited microorganism or other biological material	:	9. ☐	sequence listing in electronic form (indicate type and number of carriers)	:	(i) ☐	copy submitted for the purposes of international search under Rule 13ter only (and not as part of the international application)	:	(ii) ☐	(only where check-box (b)(i) or (c)(i) is marked in left column) additional copies including, where applicable, the copy for the purposes of international search under Rule 13ter	:	(iii) ☐	together with relevant statement as to the identity of the copy or copies with the sequence listing mentioned in left column	:	10. ☐	tables in electronic form related to sequence listing (indicate type and number of carriers)	:	(i) ☐	copy submitted for the purposes of international search under Section 802(b-quater) only (and not as part of the international application)	:	(ii) ☐	(only where check-box (b)(ii) or (c)(ii) is marked in left column) additional copies including, where applicable, the copy for the purposes of international search under Section 802(b-quater)	:	(iii) ☐	together with relevant statement as to the identity of the copy or copies with the tables mentioned in left column	:	11. ☐	other (specify):	:
request (including declaration sheets)	5																																																																							
description (excluding sequence listing and/or tables related thereto)	10																																																																							
claims	3																																																																							
abstract	1																																																																							
drawings	8																																																																							
Sub-total number of sheets	27																																																																							
sequence listing																																																																								
tables related thereto																																																																								
<i>(for both, actual number of sheets if filed on paper, whether or not also filed in electronic form; see (b) below)</i>																																																																								
Total number of sheets	27																																																																							
1. ☐	fee calculation sheet	:																																																																						
2. ☒	original separate power of attorney	:																																																																						
3. ☐	original general power of attorney	:																																																																						
4. ☐	copy of general power of attorney; reference number, if any:	:																																																																						
5. ☐	statement explaining lack of signature	:																																																																						
6. ☐	priority document(s) identified in Box No. VI as item(s):	:																																																																						
7. ☐	translation of international application into (language):	:																																																																						
8. ☐	separate indications concerning deposited microorganism or other biological material	:																																																																						
9. ☐	sequence listing in electronic form (indicate type and number of carriers)	:																																																																						
(i) ☐	copy submitted for the purposes of international search under Rule 13ter only (and not as part of the international application)	:																																																																						
(ii) ☐	(only where check-box (b)(i) or (c)(i) is marked in left column) additional copies including, where applicable, the copy for the purposes of international search under Rule 13ter	:																																																																						
(iii) ☐	together with relevant statement as to the identity of the copy or copies with the sequence listing mentioned in left column	:																																																																						
10. ☐	tables in electronic form related to sequence listing (indicate type and number of carriers)	:																																																																						
(i) ☐	copy submitted for the purposes of international search under Section 802(b-quater) only (and not as part of the international application)	:																																																																						
(ii) ☐	(only where check-box (b)(ii) or (c)(ii) is marked in left column) additional copies including, where applicable, the copy for the purposes of international search under Section 802(b-quater)	:																																																																						
(iii) ☐	together with relevant statement as to the identity of the copy or copies with the tables mentioned in left column	:																																																																						
11. ☐	other (specify):	:																																																																						
Figure of the drawings which should accompany the abstract:	Language of filing of the international application: English																																																																							
Box No. X SIGNATURE OF APPLICANT, AGENT OR COMMON REPRESENTATIVE <i>Next to each signature, indicate the name of the person signing and the capacity in which the person signs (if such capacity is not obvious from reading the request).</i>																																																																								
 Abraham Joseph	<i>For Bajaj Auto Limited</i>  SRINIVASAN RAVAKUMAR VICE PRESIDENT (B. D.)																																																																							
For receiving Office use only																																																																								
1. Date of actual receipt of the purported international application:	2. Drawings: ☐ received: ☐ not received:																																																																							
3. Corrected date of actual receipt due to later but timely received papers or drawings completing the purported international application:																																																																								
4. Date of timely receipt of the required corrections under PCT Article 11(2):																																																																								
5. International Searching Authority (if two or more are competent): ISA /	6. ☐ Transmittal of search copy delayed until search fee is paid																																																																							
For International Bureau use only																																																																								
Date of receipt of the record copy by the International Bureau:																																																																								