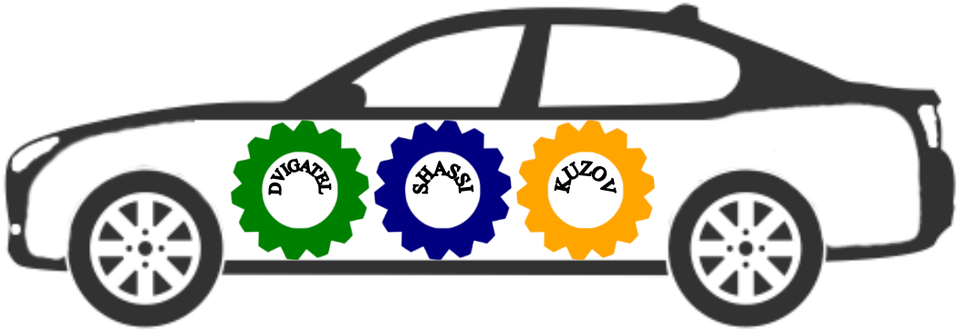
VEHICLES CONSTRUCTION

AVTOMOBILLAR KONSTRUKSIYASI



14th Topic: Steering.

(14-Mavzu: Rul boshqarmasi.)

Part 2

Associate Professor: Yusupov Sarvarbek

14-Mavzu: Rul boshqarmasi.

(14th Topic: Steering.)

O‘quv rejasi:

14.1. Rul boshqarmasining zaruriyati, vazifasi va turlari.

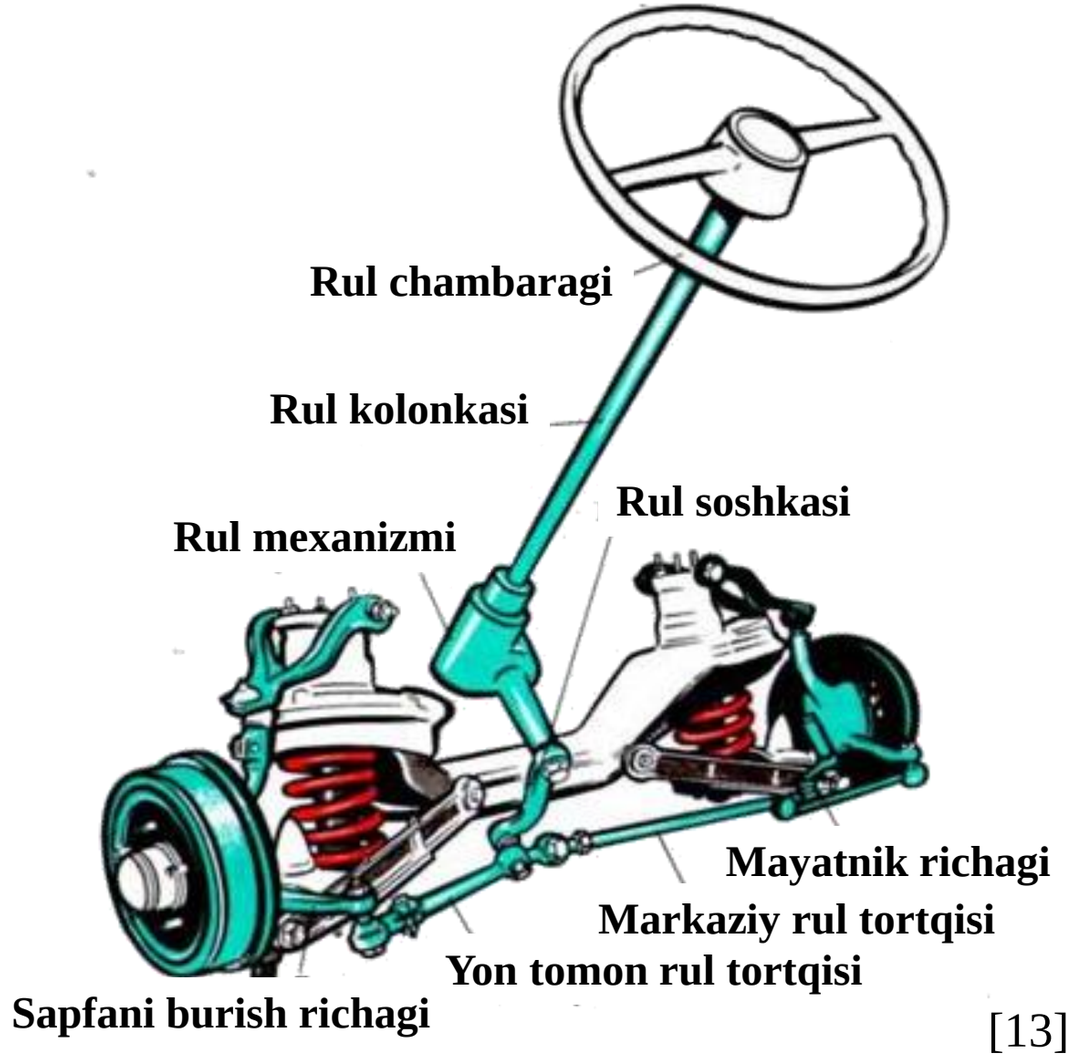
14.2. Rul mexanizmlari, turlari va konstruksiyasi.

14.3. Rul yuritmasi va uning konstruksiyalari.

14.4. Rul yuritmasining kuchaytirgichlari va konstruksiyalari.

14.3. Rul yuritmasi va uning konstruksiyalari.

Rul yuritmasi boshqariluvchi g‘ildiraklarni to‘g‘ri nisbatda θ_I > va θ_T < burchaklarda $R_{min.bur}$ bo‘yicha burilishini, **boshqariluvchi g‘ildiraklarda avtotebranishlar bo‘lmasligini** hamda avtomobilning **osmalari tebranishida** g‘ildiraklarni **o‘z-o‘zidan burilishini oldini olishni ta’minlaydi.**



[13]

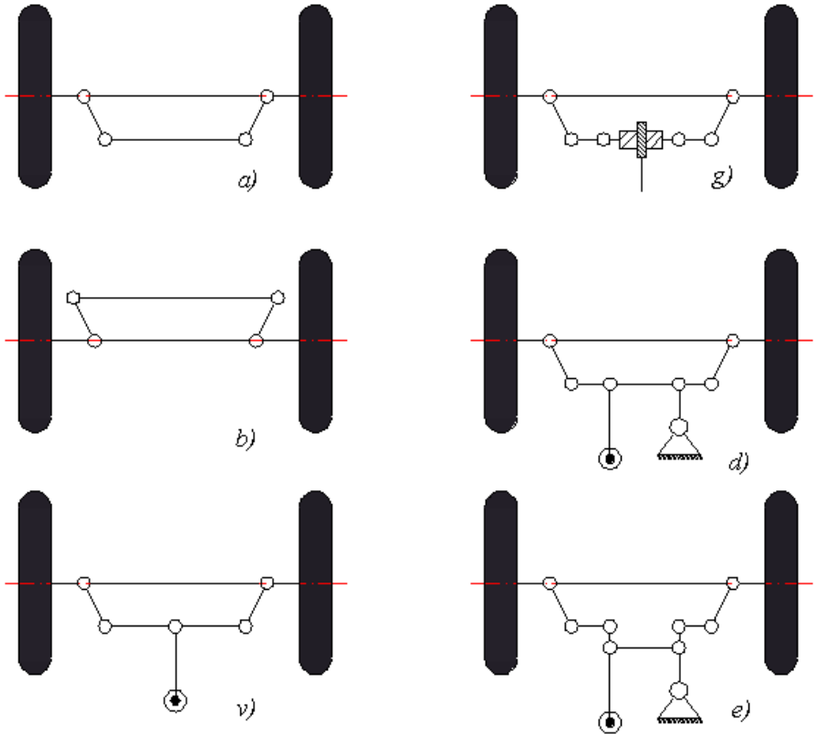
Rul yuritmasi:

rul tresiyasidan,

rul mexanizmini rul trapetsiyasi bilan bog‘lovchi **richaglar** va **tortqilardan**,

sharnirli birikmalar hamda ko‘pchilik avtomobillarda **rul kuchaytirgichidan** tashkil topgan.

Rul yuritmasi tortqi va **richaglar** bilan birga **rul trapetsiya shaklini hosil qiladi.**

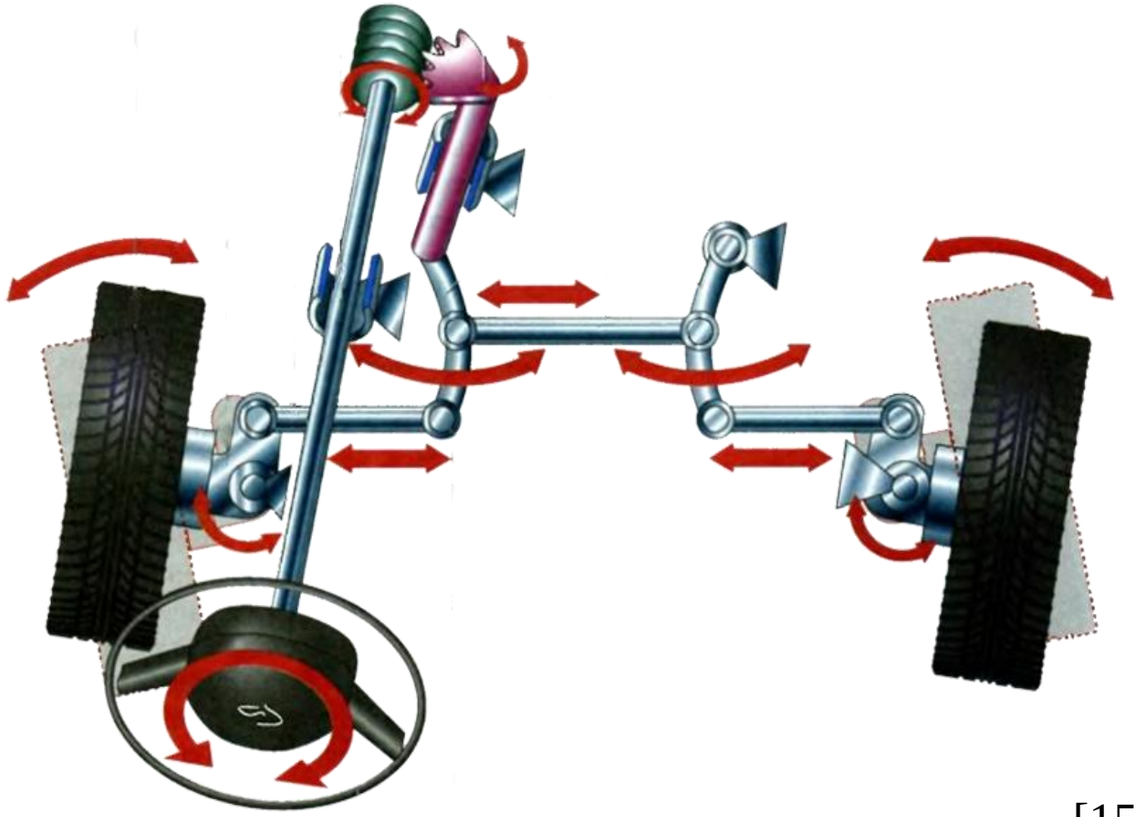


a-ko‘prik orqasida joylashgan trapesiya; b-ko‘prik oldida joylashgan trapesiya; v-sharnirli trapesiya; g-olti sharnirli trapesiya; d-olti sharnirli mayatnik richagli trapesiya; e-sakkiz sharnirli mayatnik richagli trapesiya. [14]

Rul yuritmasidagi tortqilar bir-biri bilan **sharnirlar** orqali bog‘langan bo‘lishi kerak.

G‘ildirakni burganda **rul yuritmasining** detallari bir-biriga nisbatan harakatlanadi.

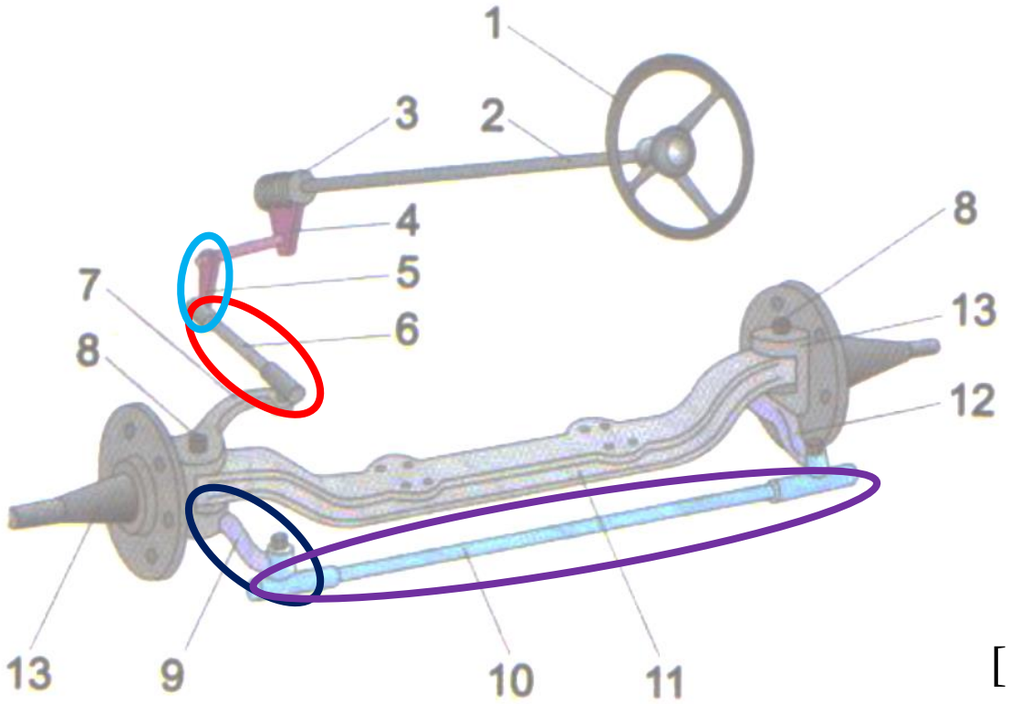
G‘ildiraklar notekis yo‘ldan yurganda va **kuzov g‘ildiraklarga nisbatan tebranganda** yuritma detallarining **bir-biriga nisbatan harakati sodir bo‘ladi.**



[15]

Nomustaqil osmali avtomobil rul bosqarmasining konstruksiyasi.

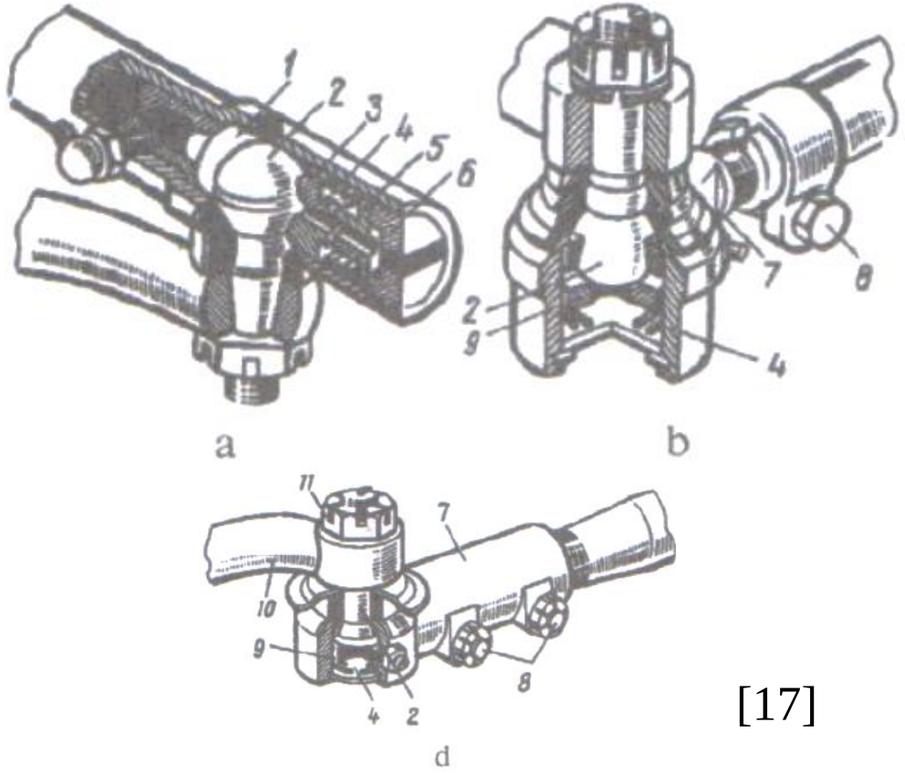
Yuritma detallari bir-birlariga nisbatan gorizontal va vertikal tekisliklarda ishonchli harakatiga imkon yaratish uchun **bo‘ylama tortqi** **soshka** bilan va **burilish sapfasi richagi**, shuningdek **ko‘ndalang tortqi**, richaglar bilan birikishi sharsimon sharnir usulda qotirilgan bo‘ladi.



[16]

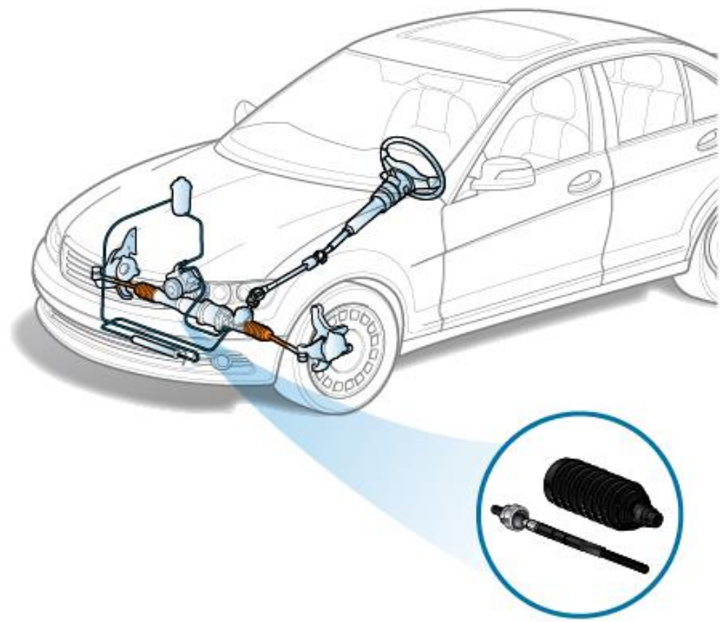
1-rul chambaragi, 2-rul kolonkasi, 3-chervyak,
4-sektor, 5-soshka, 6-bo‘ylama tortqi,
7,9 va 12-g‘ildiraklarni burish sapfalari richaglari,
8-sapfaning burilishi o‘qi - shkvoren,
10-ko‘ndalang tortqi, 11-o‘q, 13-sapfa.

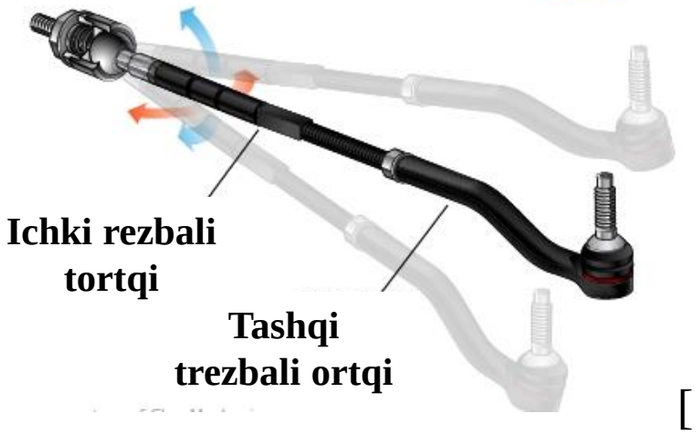
Rul yuritmasi tortqilarining sharnirlari:



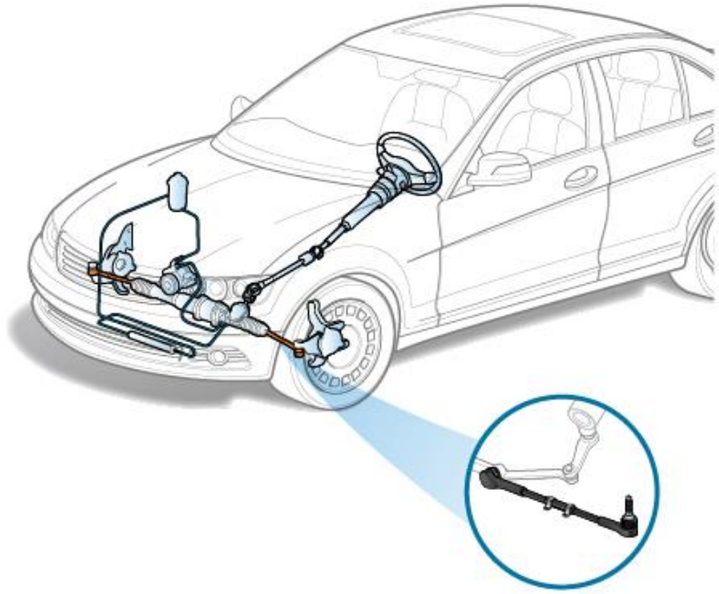
a—bo‘ylama tortqining, b, d—ko‘ndalang tortqilarning sharnirlari;
1, 3—suxarik, 2—sferik kallakli barmoq, 4—prujina, 5—cheklagich, 6—rezbali probka, 7—tortqi uchliklari, 8—boltlar, 9—ekssentrik suxariklar, 10—richag.

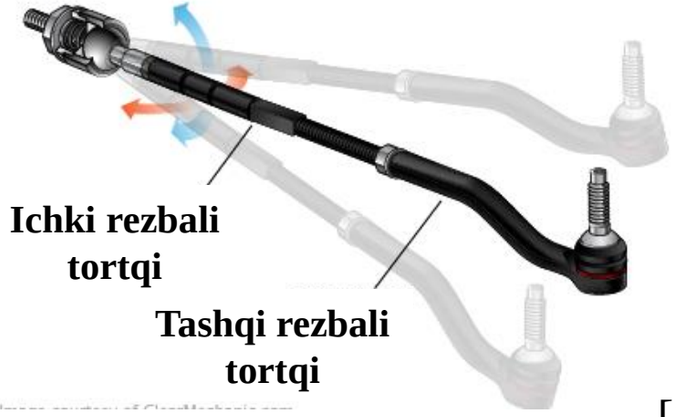
[17]





[18]





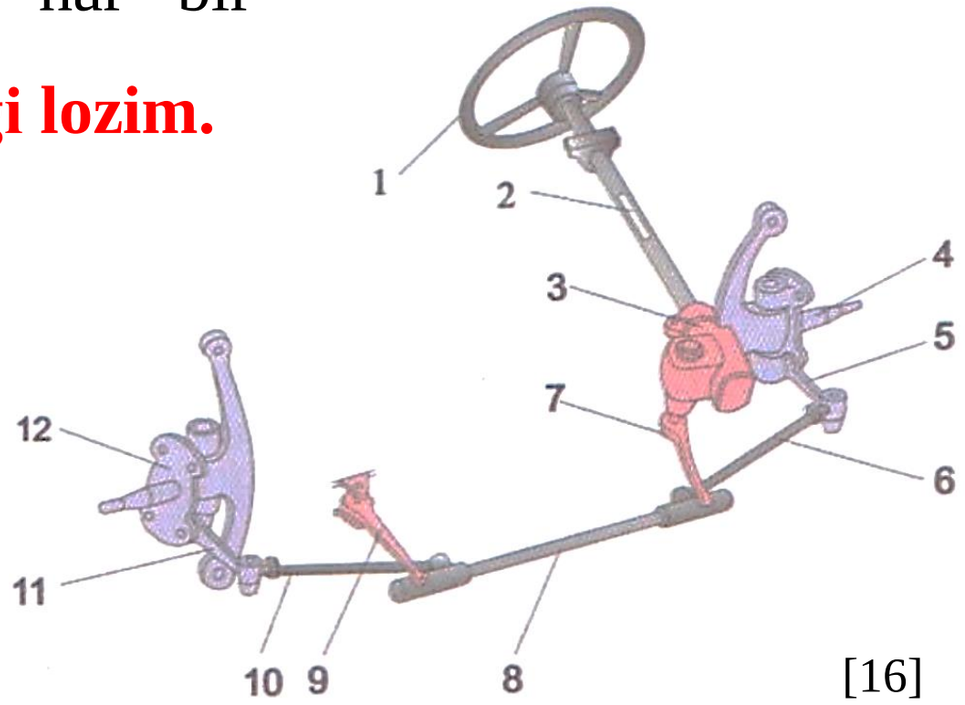
[19]

Mustaqil osmali avtomobil rul bosqarmasining konstruksiyasi.

Bu osma turida **rul yuritmasi** boshqariluvchi har bir g‘ildiraklarni **o‘z-o‘zidan burilishiga yo‘l qo‘ymasligi lozim.**

Buning uchun g‘ildirakning aylanish o‘qi va yuritma tortqisining o‘qi iloji boricha yaqin bo‘lishi kerak.

Ko‘ndalang tortqi uch qismdan iborat: o‘rta tortqi va u bilan sharnir ravishda birlashtirilgan ikki yon tortqi ulangan.



[16]

1-rul chambaragi, 2-rul kolonkasi, 3-rul mexanizmi, 4, 12-sapfalar, 5, 11-richaglar, 6, 8, 10-ko‘ndalang tortqilar, 7-soshka, 9-mayatnikli richag.

O‘rta tortqi uchlari bilan bir tomondan soshkaga, ikkinchi tomondan esa tebranuvchi mayatnikli richagga sharnirli biriktirilgan.

Mayatnikli richag, avtomobil kuzoviga tebranuvchi qilib mahkamlangan.

Shuning uchun osma ressoralari deformatsiyalanganda g‘ildirakning o‘z-o‘zidan burilishiga yo‘l qo‘ymaydi.

[20]

14.4. Rul yuritmasining kuchaytirgichlari va konstruksiyalari.

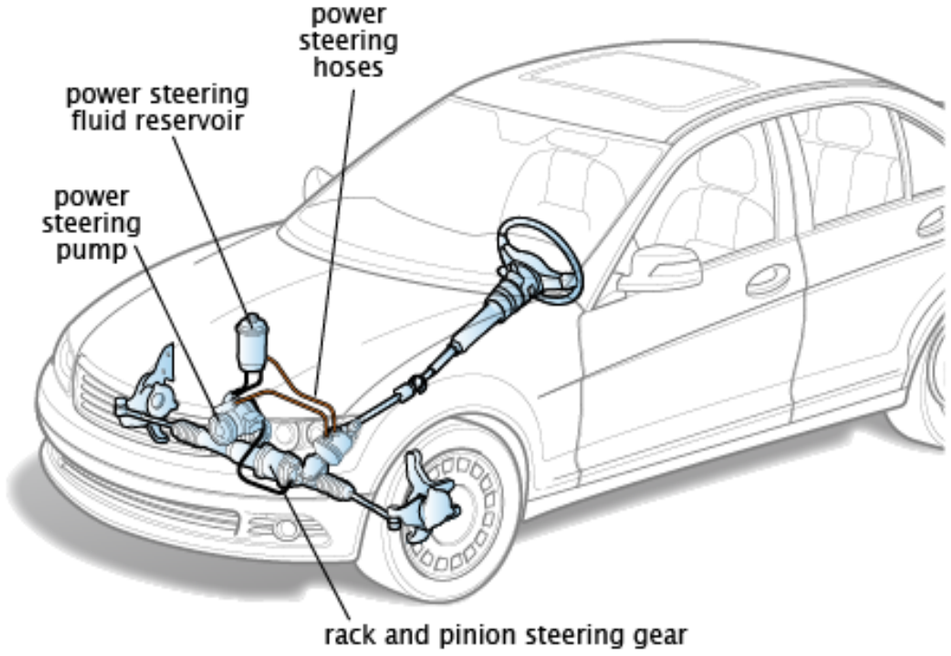
Hozirgi paytda o‘rtacha vaznli o‘tag‘on hamda o‘rta va og‘ir vaznli yuk avtomobillari, shuningdek, avtobuslarning **rul yuritmalarida kuchaytirgich ishlatiladi.**

Kuchaytirgich:

g‘ildiraklarni burishga sarflanadigan **kuchni kamaytiradi,**

natijada avtomobilning **boshqarilishini osonlashtirib,**

yengil va **qulay burilishni ta’minlaydi.**



[21]

Kuchaytirgich avtomobil notekis yo‘ldan yurganda, **rul chambaragiga ta’sir etadigan turtkini yumshatadi** va avtomobilni **katta tezlikda** uning harakatlanish **xavfsizligini oshiradi.**

Boshqariluvchi g‘ildiraklardan **biri shikastlansa**, avtomobilning to‘g‘ri chiziqli harakatini va **turg‘un holatini saqlab qolishga imkon yaratadi.**

Shuning uchun hozirgi paytda tezyurar yengil avtomobillarning rul boshqarmasi ham kuchaytirgich bilan jihozlangan.

Kuchaytirgichlar boshqarish jarayonida:

- **To‘la kuzatish qobiliyatiga ega bo‘lishi** (ya’ni, yo‘naltiruvchi g‘ildirakning burilishi, haydovchi tomonidan rul chambaragining burilishiga to‘la mos kelishi);
- **Avtomobilning to‘g‘ri chiziqli harakati paytida g‘ildirakning to‘siqqa uchrab majburan burilishida o‘z-o‘zidan ishga tushmasligi;**
- **Biror sabablar bilan shikastlanib ishdan chiqmasligi;**
- **Avtomobilning boshqarilishiga xalaqit bermasligi;**
- **Yuqori sezgirlikka ega bo‘lib, juda ham qisqa vaqt ichida sistemaning ishga solinishini ta’minlashi kerak.**

Kuchaytirgich quyidagi asosiy qismlardan tashkil topgan:

- **Ta’minlash manbai — gidronasos yoki kompressor;**
- **Taqsimlagich;**
- **Gidrosilindr.**

Kuchaytirgichlarni harakatga keltiradigan yuritma:

- ✓ **Gidravlik;**
- ✓ **Pnevmatik bo‘lishi mumkin.**

Kuchaytirgich qismlarining bir-biriga nisbatan joylashuvi to‘rt xil bo‘lishi mumkin:

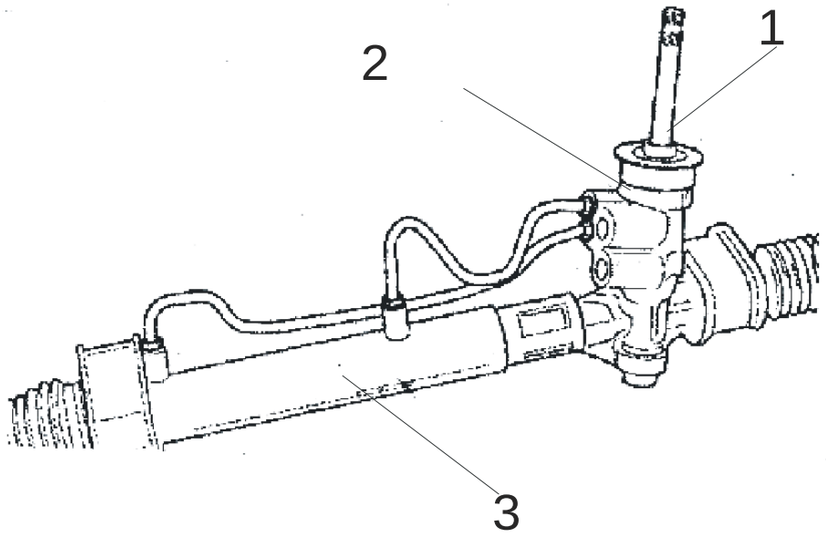
1. Kuchaytirgichning hamma qismlari bir joyda joylashgan (ta’minlash manbaidan tashqari)**.**

2. Rul mexinizmi alohida. Taqsimlagich va gidrosilindr bir agregatda joylashgan.

3. Rul mexanizmi va taqsimlagich bir agregatda **gidrosilindrda** joylashgan.

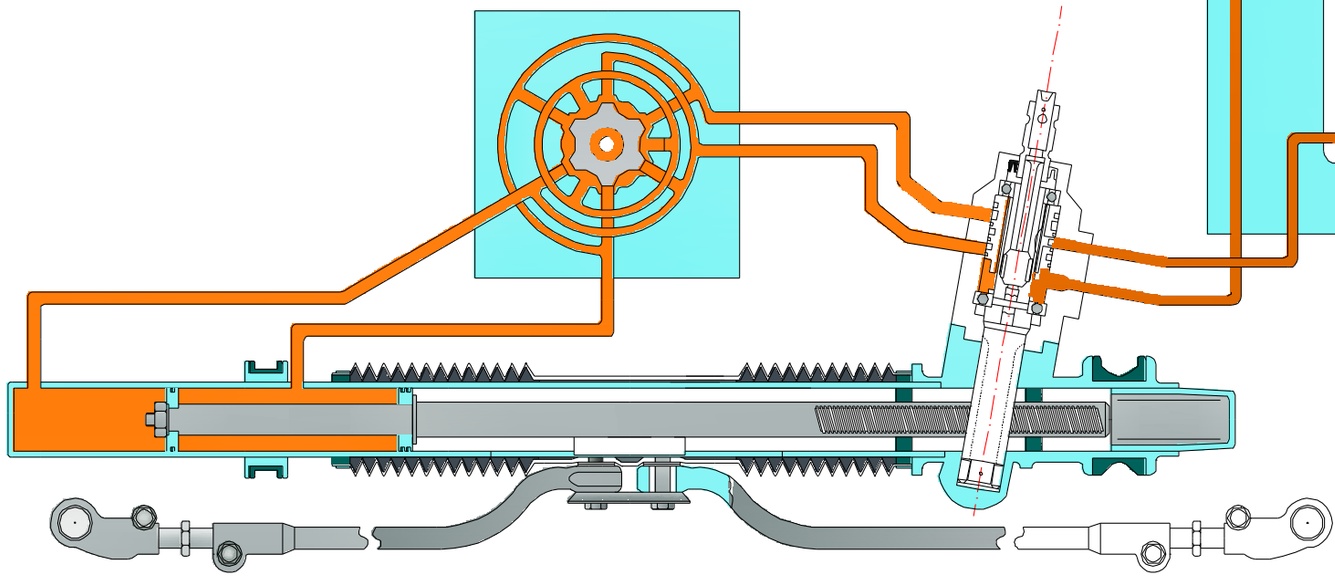
4. Hamma qismlari (rul mexanizmi, taqsimlagich, gidrosilindr) **alohida joylashgan.**

Gidravlik kuchaytirgichli rul boshqarmasi.

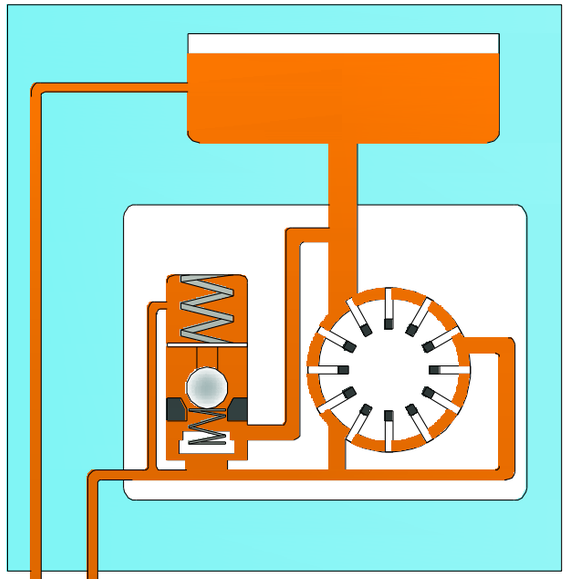


1-reyka shesternyali rul mexanizmi;
2-gidrotaqsimlagich;
3-gidrosilindr.

Aylanuvchi taqsimlagichning ko‘ndalang qirqimi



Energiya manbai (gidronassos)



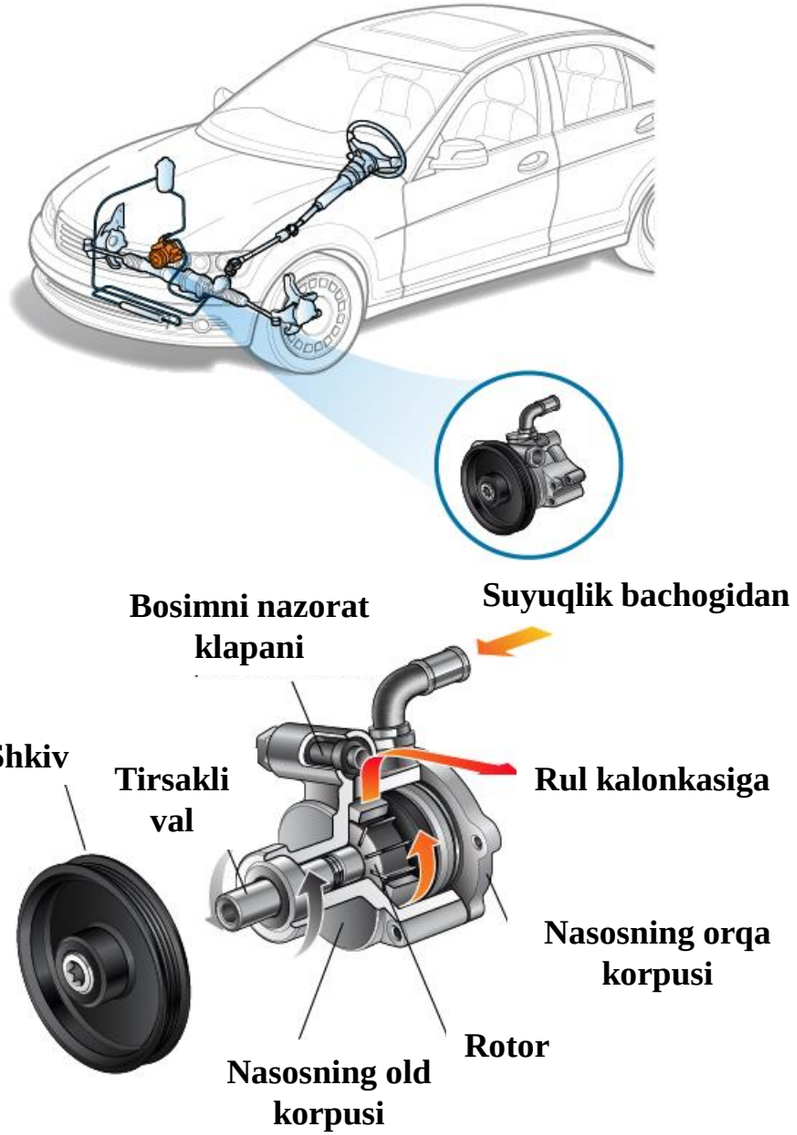
[22]

➢ Ta’minlash manbai — gidronasos yoki kompressor.

Nasos gidravlik tizimda bosim sodir qilish va suyuqlikni sirkulyatsiyasi uchun xizmat qiladi.

Plastinkali nasos turlari keng tarqalgan.

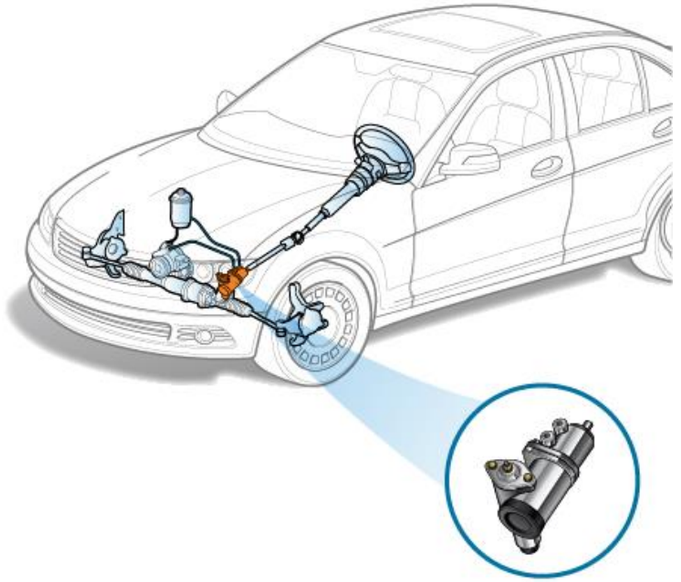
Nasos tasmali uzatma bilan harakatni tirsakli valdan oladi.

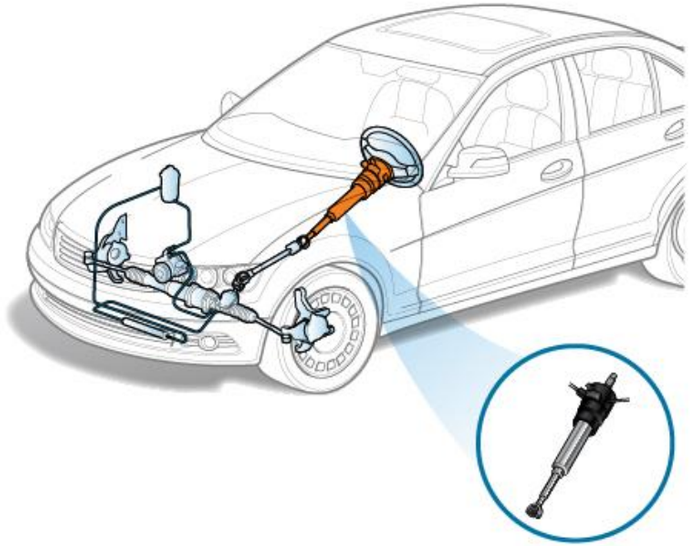


[23]

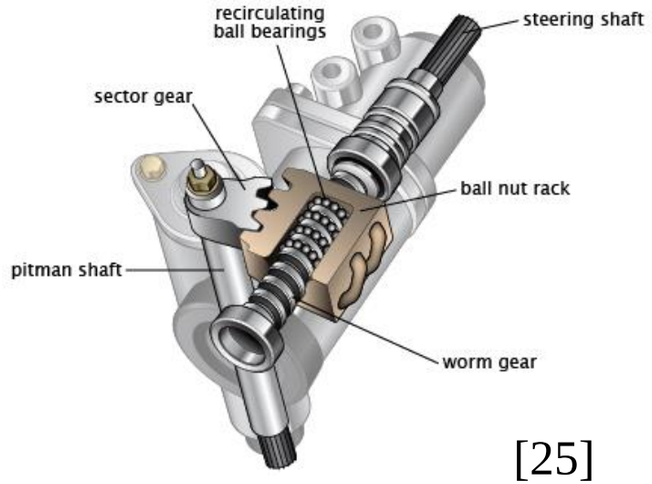
➢ Taqsimlagich.

Taqsimlagich suyuqlik oqimini gidrosilindrning porshen oldi/orqa bo‘shliqlariga yoki ulardan bachokka qaytishini boshqaradi.





Taqsimlagich zolotnigining harakatiga muvofiq chiziqli tipdagi yoki rotor tipdagi taqsimlagich deb ataladi.

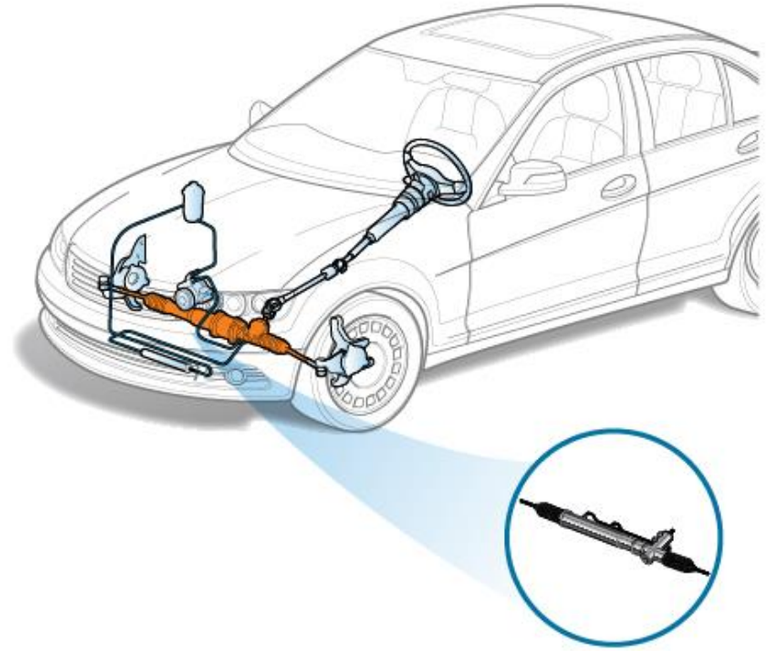


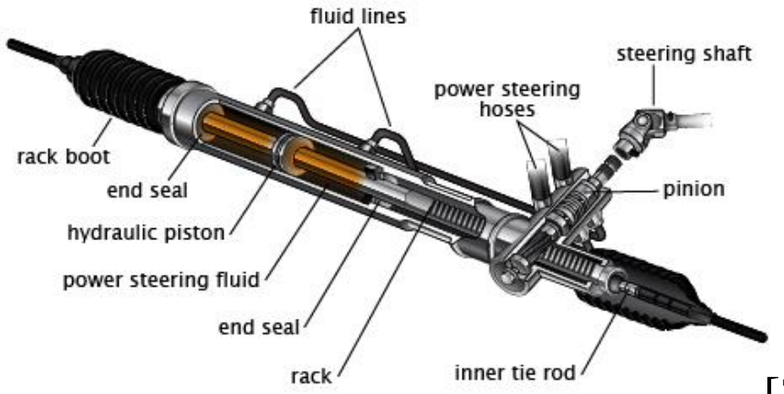
[25]

[24]

➢ Gidrosilindr.

Gidrosilindrdagi suyuqlik bosimi porshen va shtokni chiziqli harakatlantiradi va richag, tortqilar orqali g‘ildiraklarni buradi.

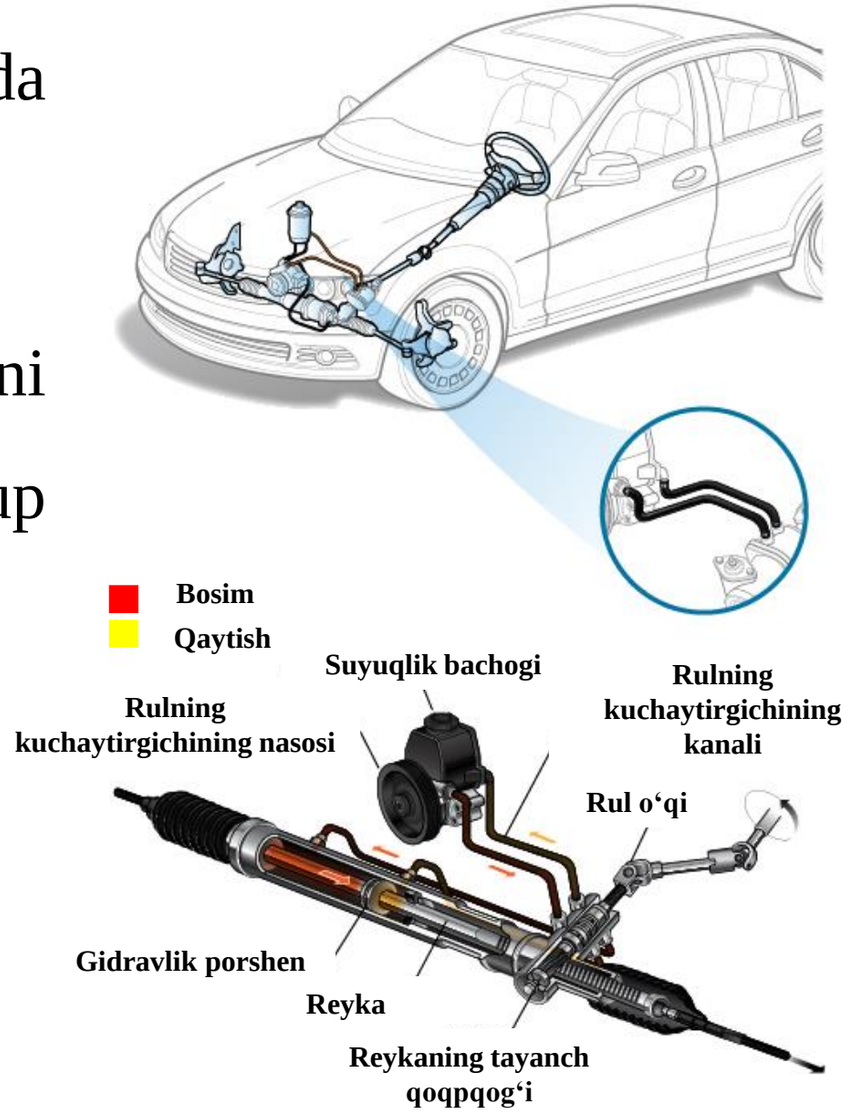




[26]

Bachok suyuqlikni saqlash uchun idish sifatida xizmat qiladi.

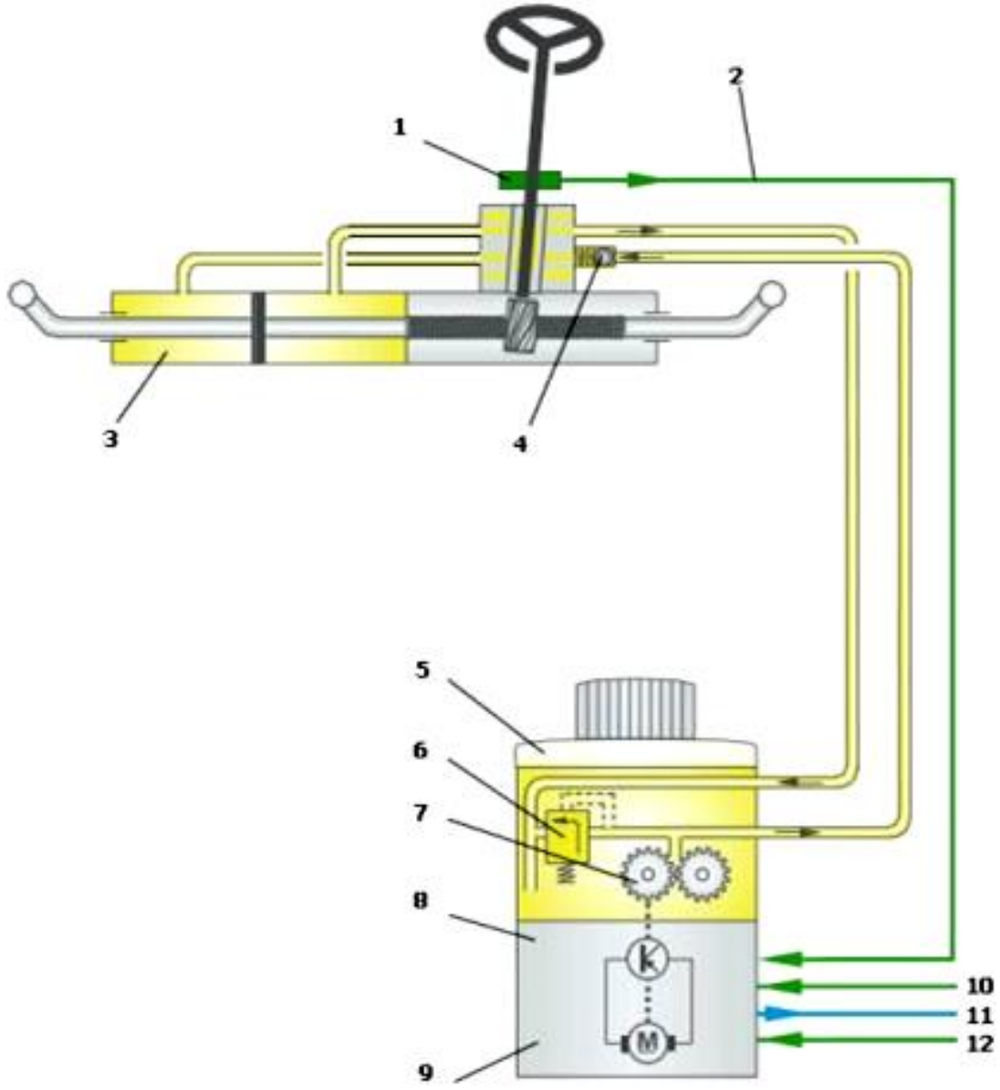
Uning ichida filtrlovchi element va moy sathini aniqlash uchun bachok probkasiga biriktirilgan shchup bo‘ladi.



[27]

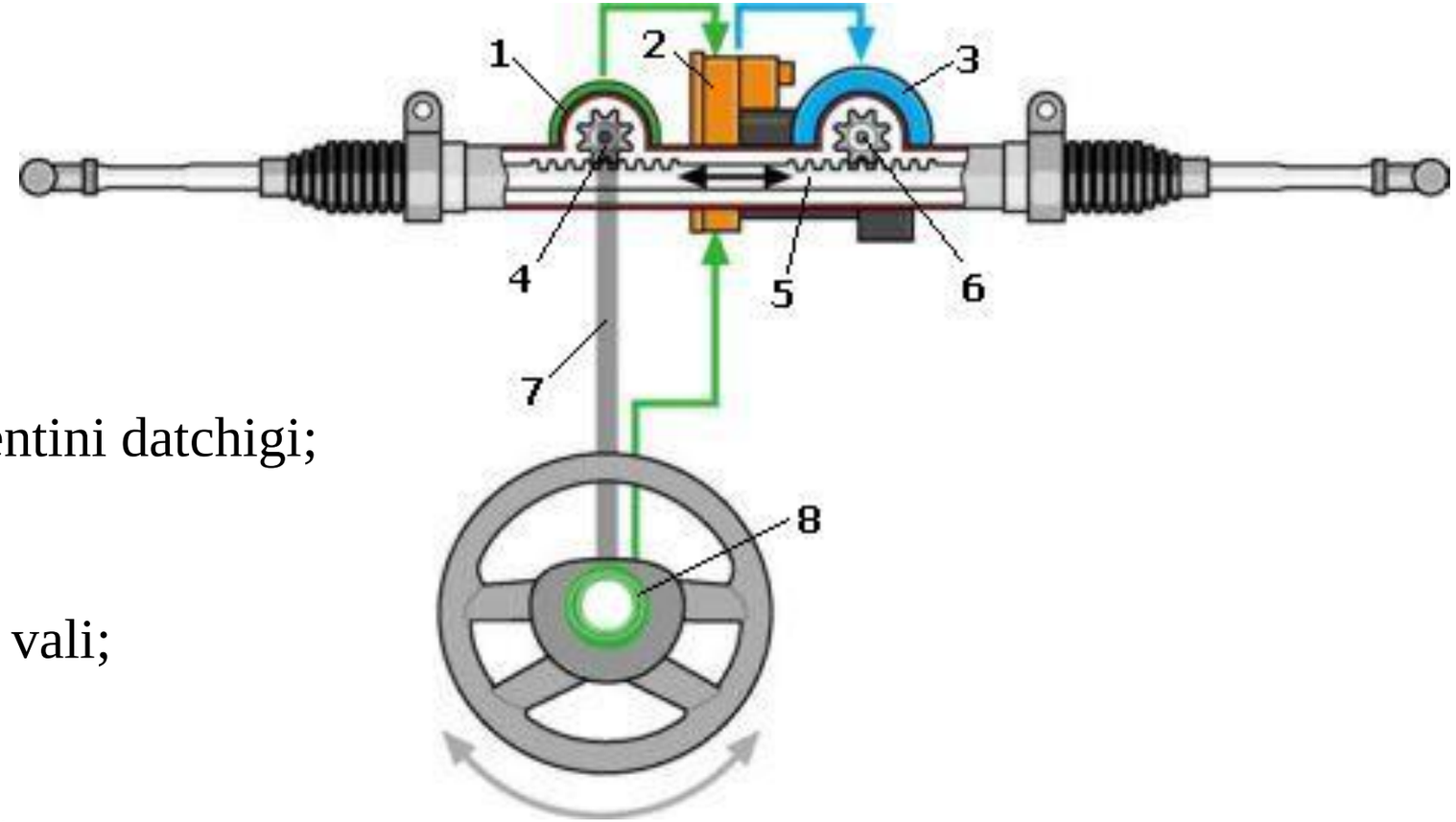
Elektrogidrokuchaytirgichli rul boshqarmasi.

1-rul kuchaytirgichining datchigi;
2-rul chambaragi burilishining tezlik signali;
3-rul mexanizmi;
4-qaytarish klapani;
5-ishchi suyuqlik bachogi;
6-reduksion klapan;
7-shesternyali nasos;
8-rul kuchaytirgichining elektron boshqaruv bloki;
9-elektrdvigatel;
10-avtomobilning harakat tezligi signali;
11-tashxislash signali;
12-dvigatel tirsakli valining burchak tezligi signali.



[28]

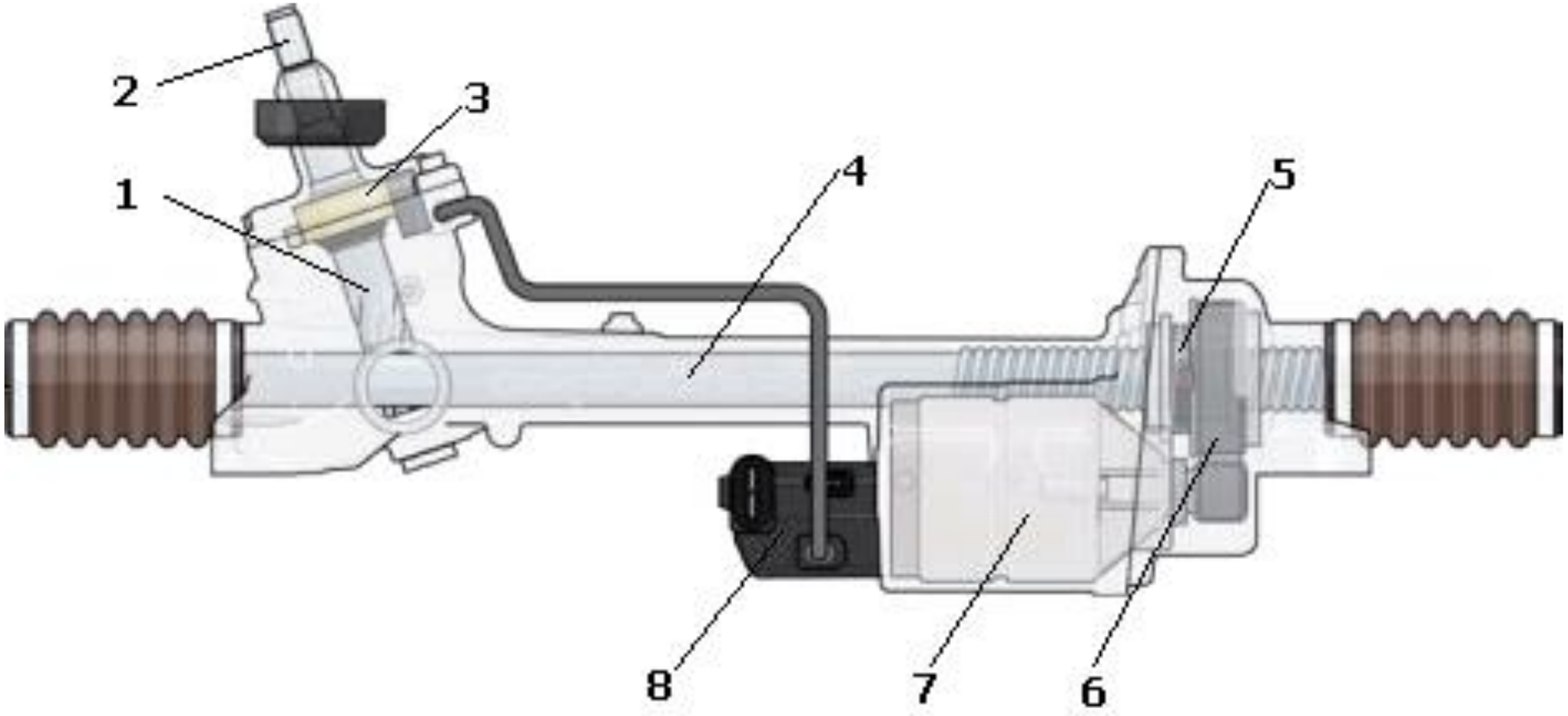
Ikki shesternyali elektromexanik kuchaytirgichli rul boshqarmasi.



1-rul chambaragini burovchi momentini datchigi;
2-elektron boshqarish bloki;
3-elektrodvigatel;
4-rul boshqarmasining shesternyali vali;
5-tishli reyka;
6-rulni kuchaytiruvchi shesternya;
7-rul boshqarmasining kardanli vali;
8-rul chambaragining burilish burchagi datchigi.

[28]

Parallel boshqariluvchi elektr mexanikli rul kuchaytirgichi.



1-shesternya vali; 2-torsionli sterjen; 3- rul halqasini burovchi momentini datchigi; 4-tishli reyka; 5-aylanuvchi sharik; 6-tasmali uzatma; 7-elektrodvigatel; 8-elektron boshqarish bloki. [28]

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