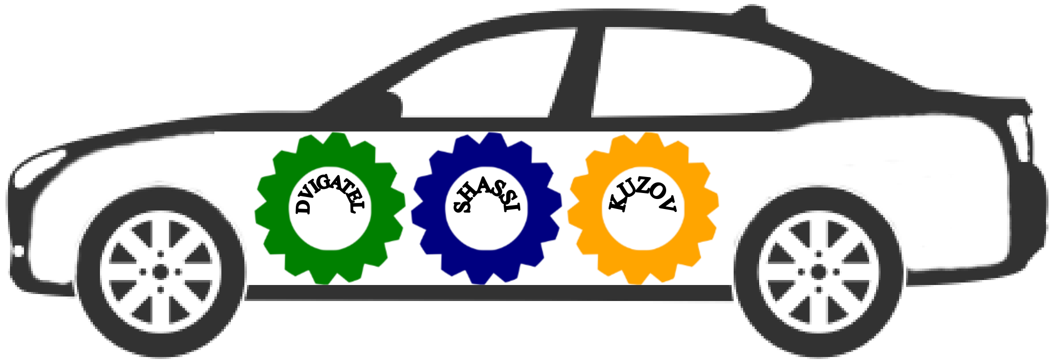
AVTOMOBILLAR KONSTRUKSIYASI



10^{th} Topic: Gearbox. Transfer gearbox.

(10-Mavzu: Uzatmalar qutisi. Taqsimlash qutisi.)

Part 1

Associate Professor: Yusupov Sarvarbek

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10-Mavzu: Uzatmalar qutisi. Taqsimlash qutisi.

(10th Topic: Gearbox. Transfer gearbox.)

O‘quv rejasi:

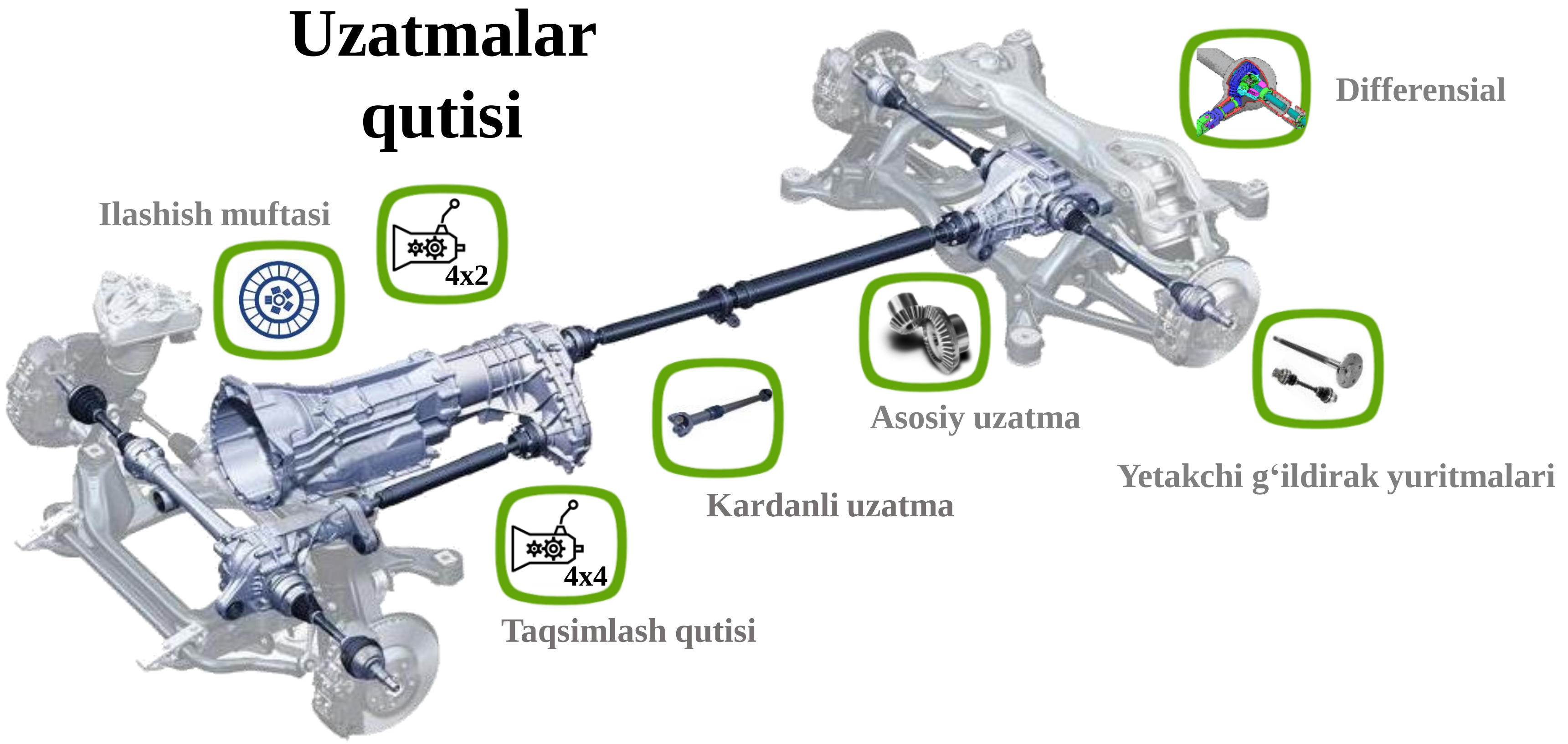
10.1. Uzatmalar qutisining vazifasi va turlari.

10.2. Pog‘onali uzatmalar qutisining konstruksiyasi va uning ishlashi.

10.3. Pog‘onasiz uzatmalar qutisining konstruksiyasi va uning ishlashi.

10.4. Taqsimlash qutisining vazifasi, konstrusiyalari va ularning ishlashi.

TRANSMISSIYA



[1]

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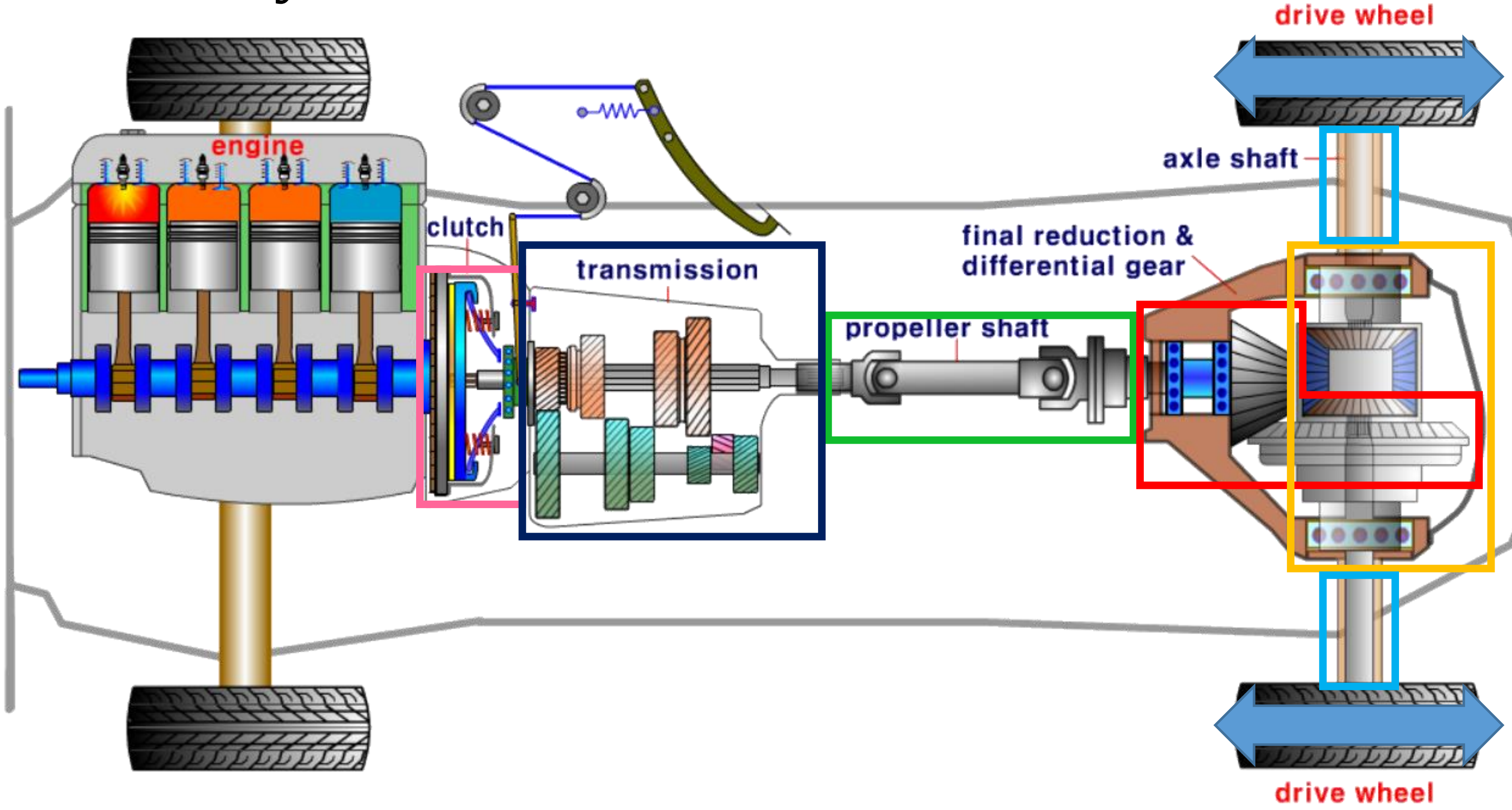
10.1. Uzatmalar qutisining vazifasi va turlari.

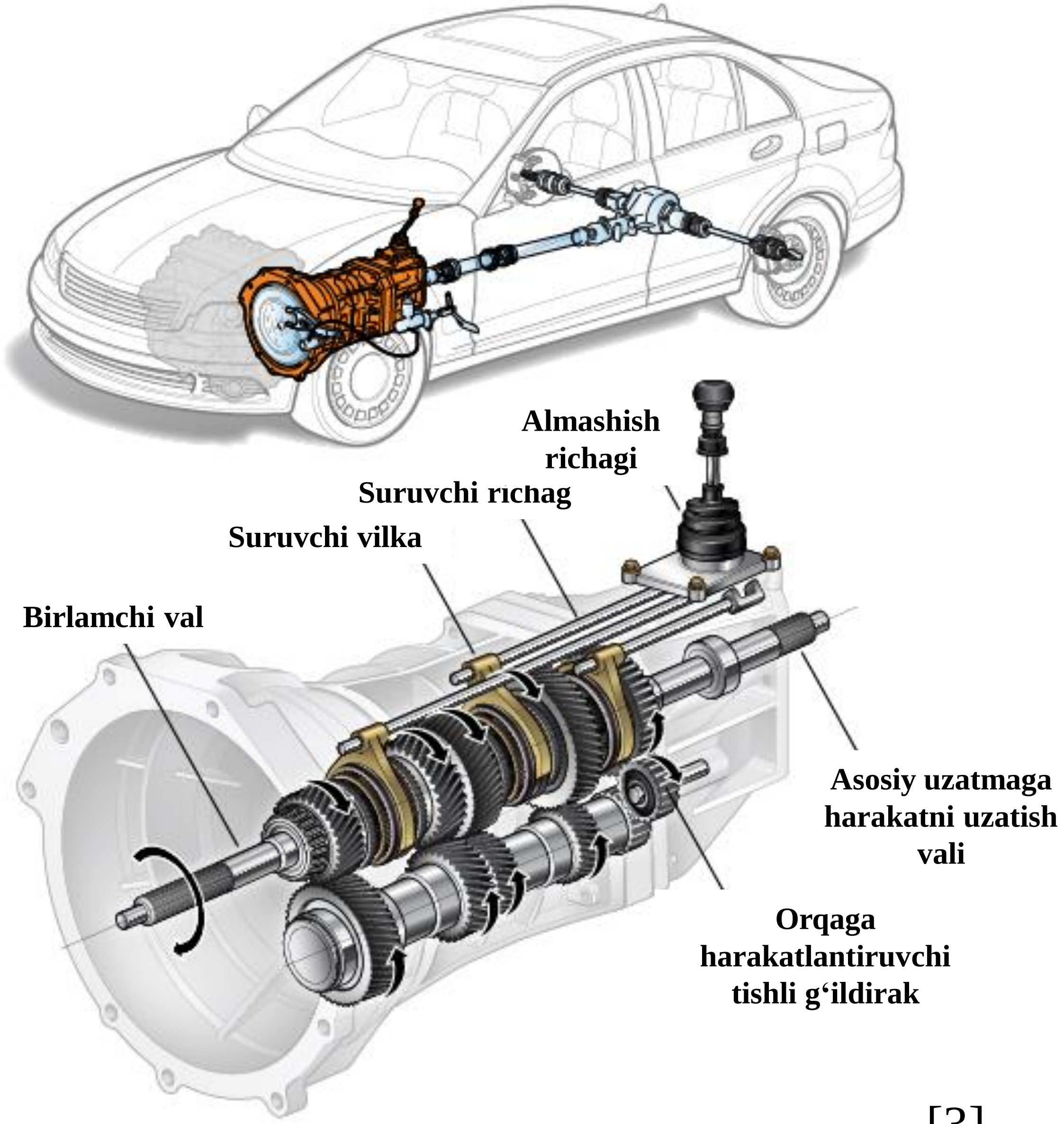
Avtomobilni harakatlanishida dvigatel tirsakli vali va yetakchi g‘ildiraklarning burchak tezliklari o‘rtasidagi nisbatni o‘zgartiruvchi transmissiya mexanizmi **UZATMALAR QUTISI** deyiladi.



[2]

Vazifasi:

- ✓ **Uzatmalar qutisi yetakchi g‘ildiraklardagi burovchi momentni o‘zgartirish;**
- ✓ **Dvigatelni transmissiyadan uzoq muddatga ajratish;**
- ✓ **Avtomobilni orqaga yurishini ta’minlash;**
- ✓ **Qo‘shimcha jihozlarga quvvat uzatish.**



[3]

Yetakchi g‘ildiraklardagi **burovchi momentni o‘zgartirish** yo‘l sharoitiga tegishli ravishda maqbul **tezlikni** va avtomobil **o‘tag‘onligini** ta’minlash hamda **dvigatelni** **eng tejamkorlikda** ishlashi uchun zarur.

[4]

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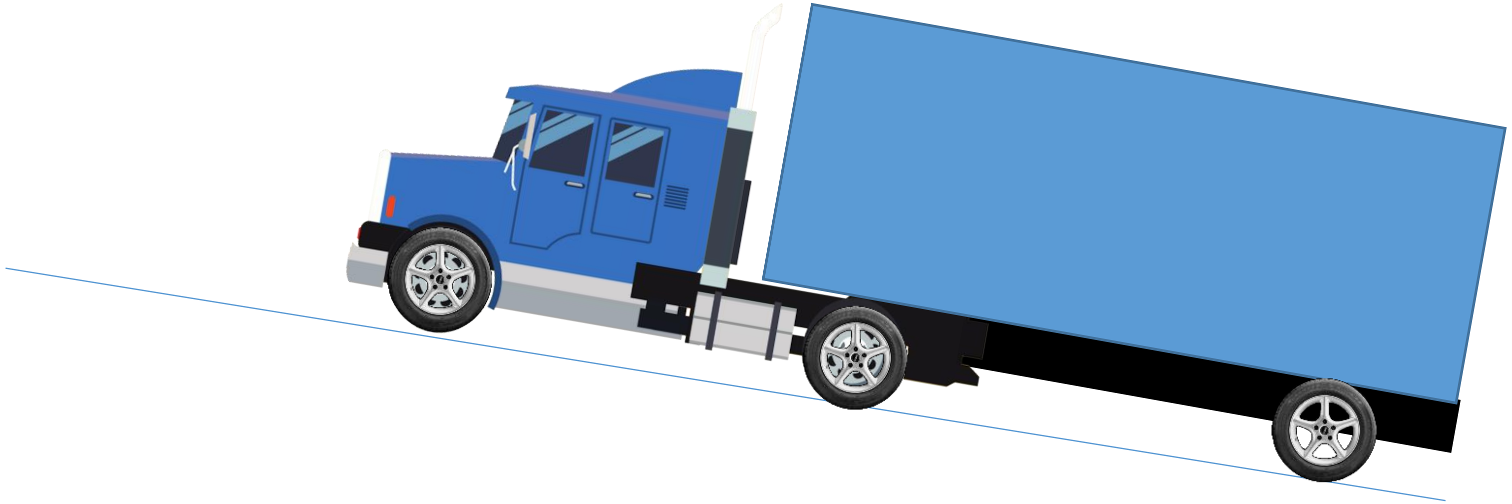
Avtomobil **joyidan qo‘zg‘alishida** tez tezlanish olish uchun va **harakatiga sezilarli qarshilik kuchlarini yengish uchun**, dvigatelning maksimal momentiga to‘g‘ri keladigan qiymatga qaraganda **tortish kuchi bir necha bor katta bo‘lishi kerak.**

Tortish kuchini bunday ko‘paytirish **uzatishlar sonini** o‘zgartirish bilan ta‘minlanadi.

[5]

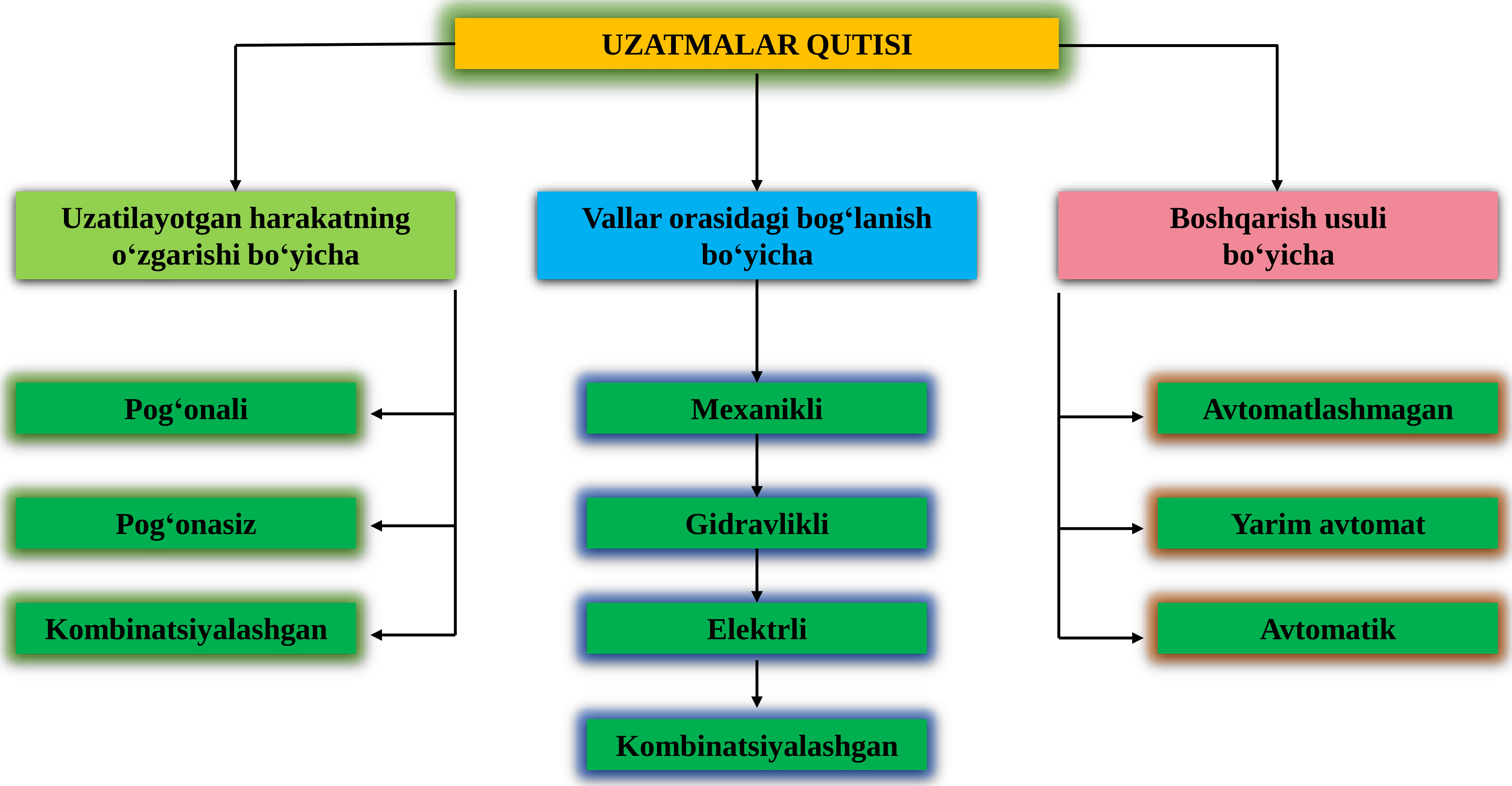

[6]

Uzatmalar qutisining **uzatishlar soni** uning **yetakchi** va **yetaklanuvchi vallarini aylanish chastotalariga nisbati bilan aniqlanadi.**

Uzatishlar sonini o‘zgartirishning zarurligi yo‘l sharoitiga va avtomobil harakatiga qarshilik kuchlari yengishga bog‘liq.

Porshenli dvigatelning **burovchi momenti esa**, eng yuqori yonilg‘i uzatilganda, bor-yo‘g‘i **10-30% ga o‘zgarishi mumkin.**

Uzatmalar qutisining turlari.



[7]

10.2. Pog‘onali uzatmalar qutisining konstruksiyasi va uning ishlashi.

Zamonaviy avtomobillarda **pog‘onali** va **pog‘onasiz** uzatmalar qutisi qo‘llanadi.

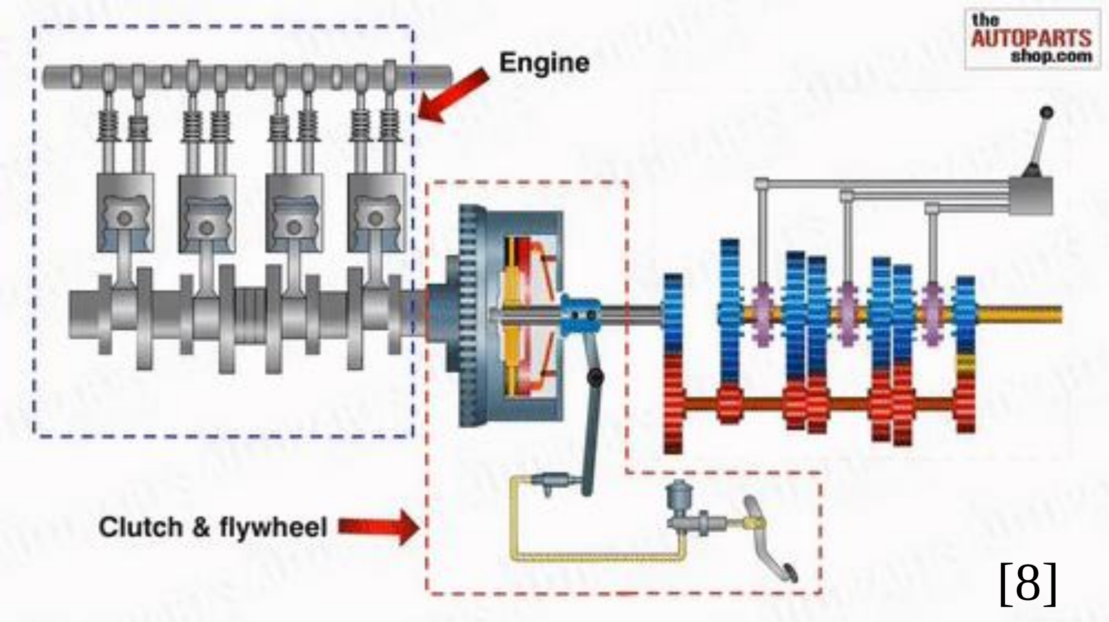
Pog‘onali uzatmalar qutisi asosan tishli g‘ildirak mexanizmdan tashkil topgan.

Avtomobilning har xil yo‘l sharoitiga moslashib tezlik va tezlanishni ta‘minlaydi. Shu bilan birga, **uzatish sonini** har xil qiymatga ega bo‘lgan bir nechta juft tishli shesternyalar orqali amalga oshiriladi.

Pog‘onali

Yengil avtomobillarda – 3; 4 yoki 5.

Yuk avtomobilida esa – 4; 5; 8 va undan ko‘p.



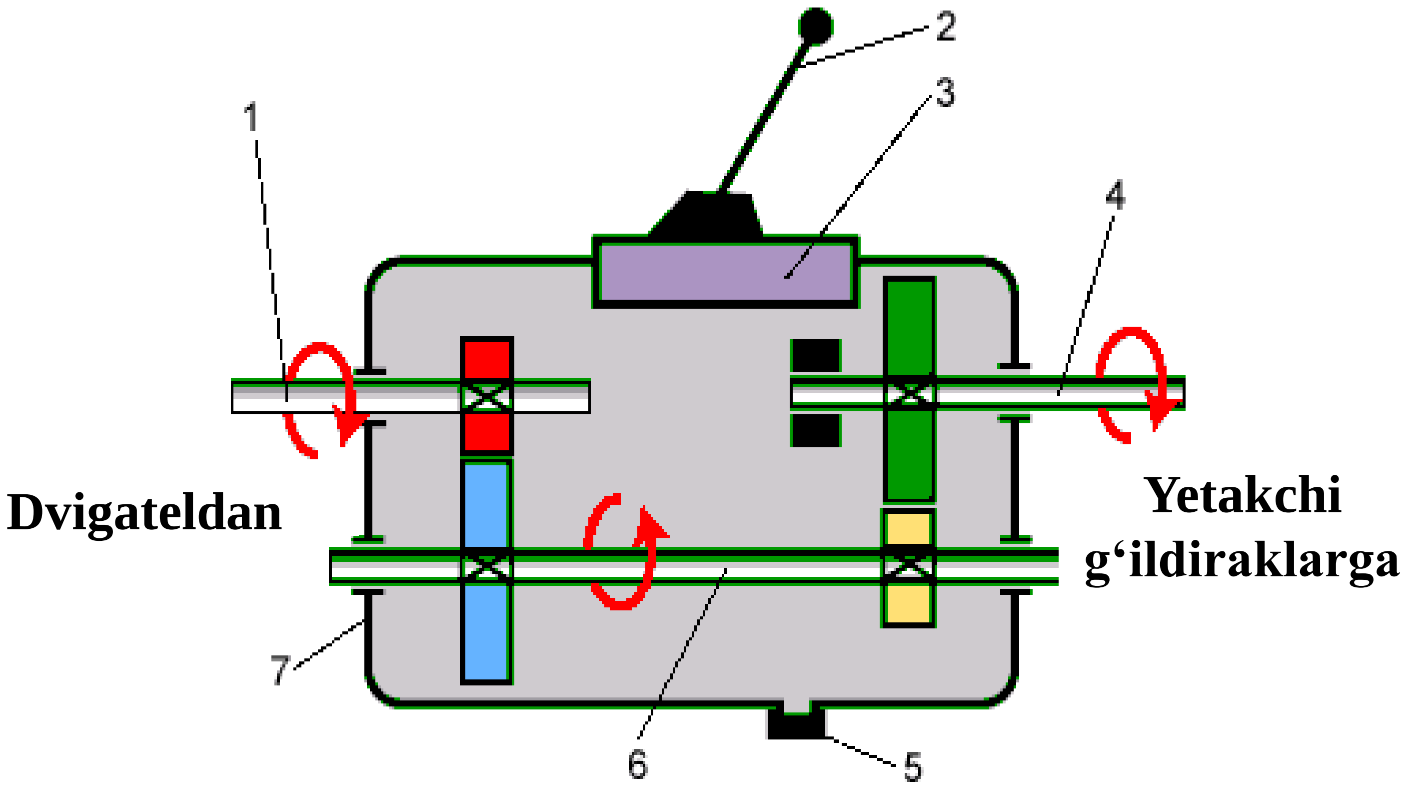
[8]

Pog‘onali uzatmalar qutisining soda konstruksiyasi.

Avtomobil uzatmalar qutisining tishli mexanizmlari odatda silindrik tishli g‘ildiraklardan iborat.

Ular qo‘zg‘almas geometrik o‘qli yoki planetar qilib tayyorlanadi.

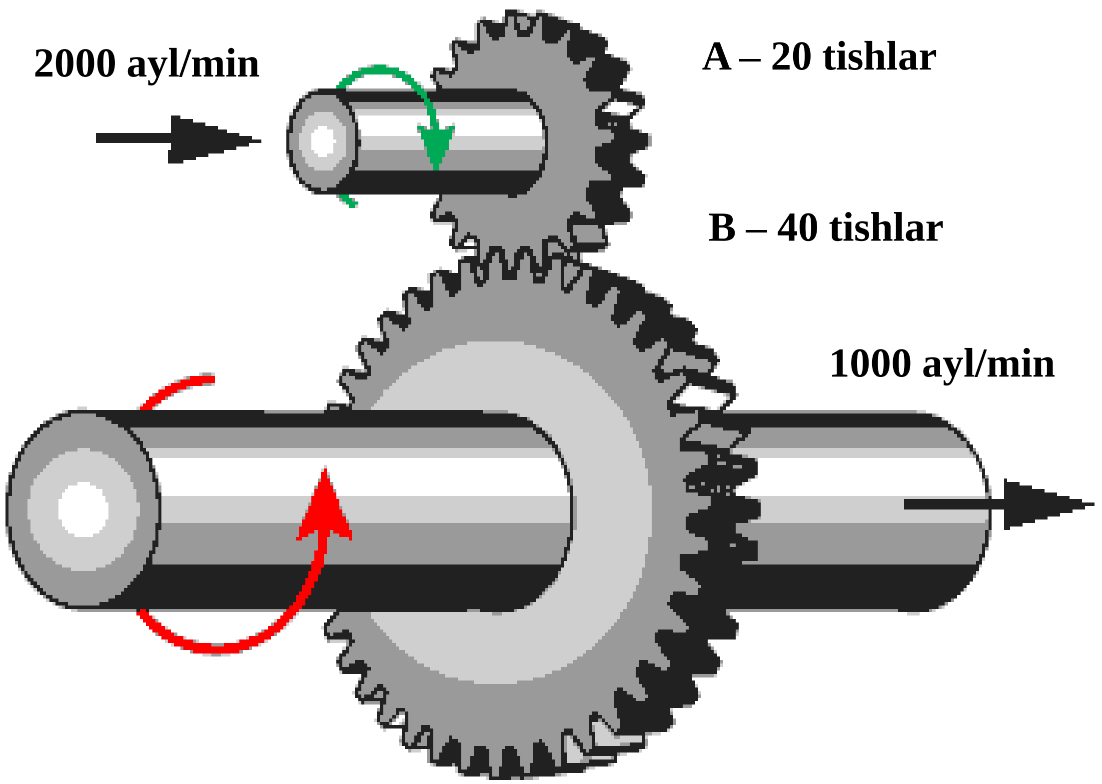
Ikkita ilashib turgan tishli g‘ildiraklarning kichigi **shesternya**, kattasi **g‘ildirak** deb ataladi.

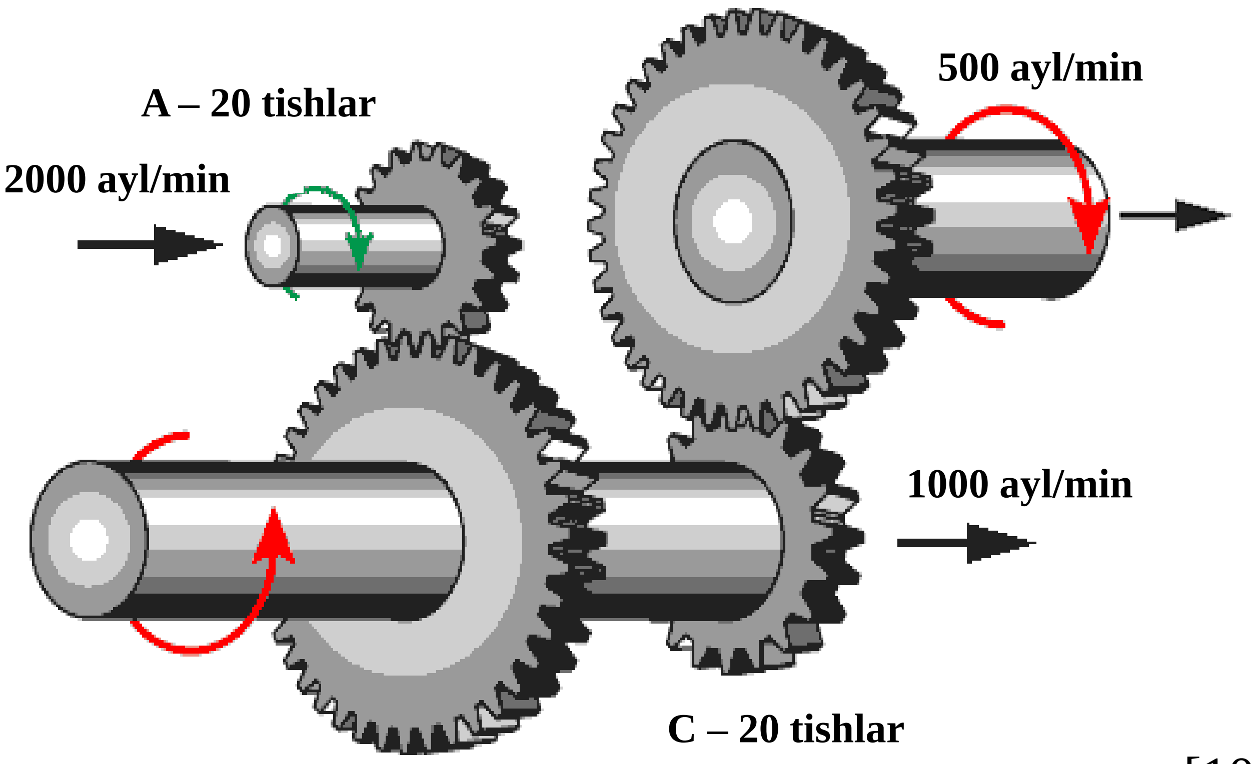


1-uzatmalar qutisining birlamchi yetaklovchi vali; 2-richak; 3-yuritma mexanizmi; 4-yetaklanuvchi val; 5-karterdagi moyni to‘kish uchun rezbali tiqin; 6-oraliq val.

[9]

Pog‘onali mexanik uzatmalar qutisining tishli g‘ildirak va shesternyalari.





[10]

A-tishli shesternya (yetaklovchi);

B-tishli g‘ildirak (yetaklanuvchi).

C-yetaklovchi shesternya;

D-yetaklanuvchi tishli g‘ildirak.

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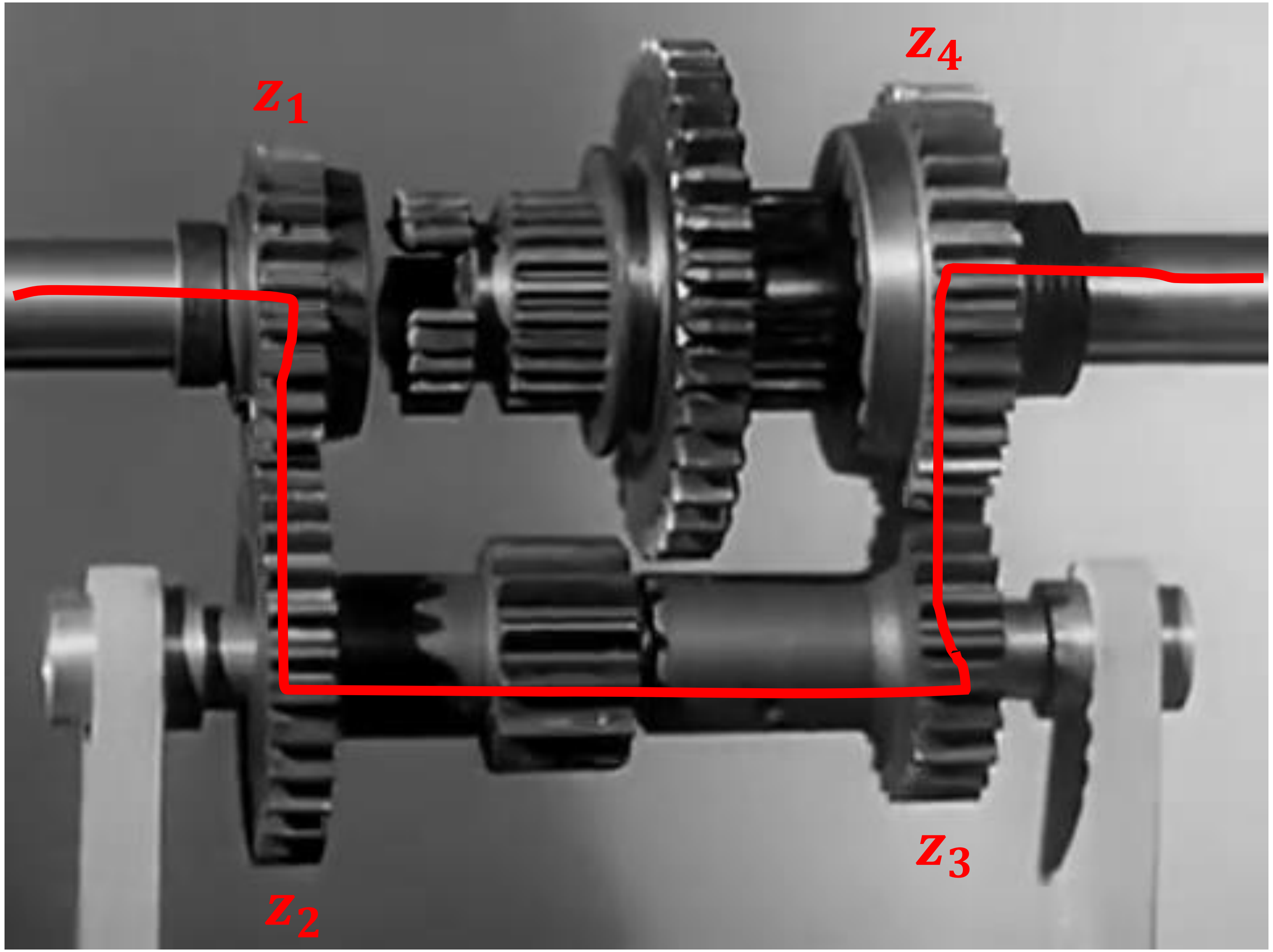
Pog‘onali mexanik uzatmalar qutisining uzatishlar soni tushunchasi.

$$U_1 = \frac{z_2}{z_1} = \frac{40}{20} = 2$$

$$U = \frac{z_2}{z_1} * \frac{z_4}{z_3}$$

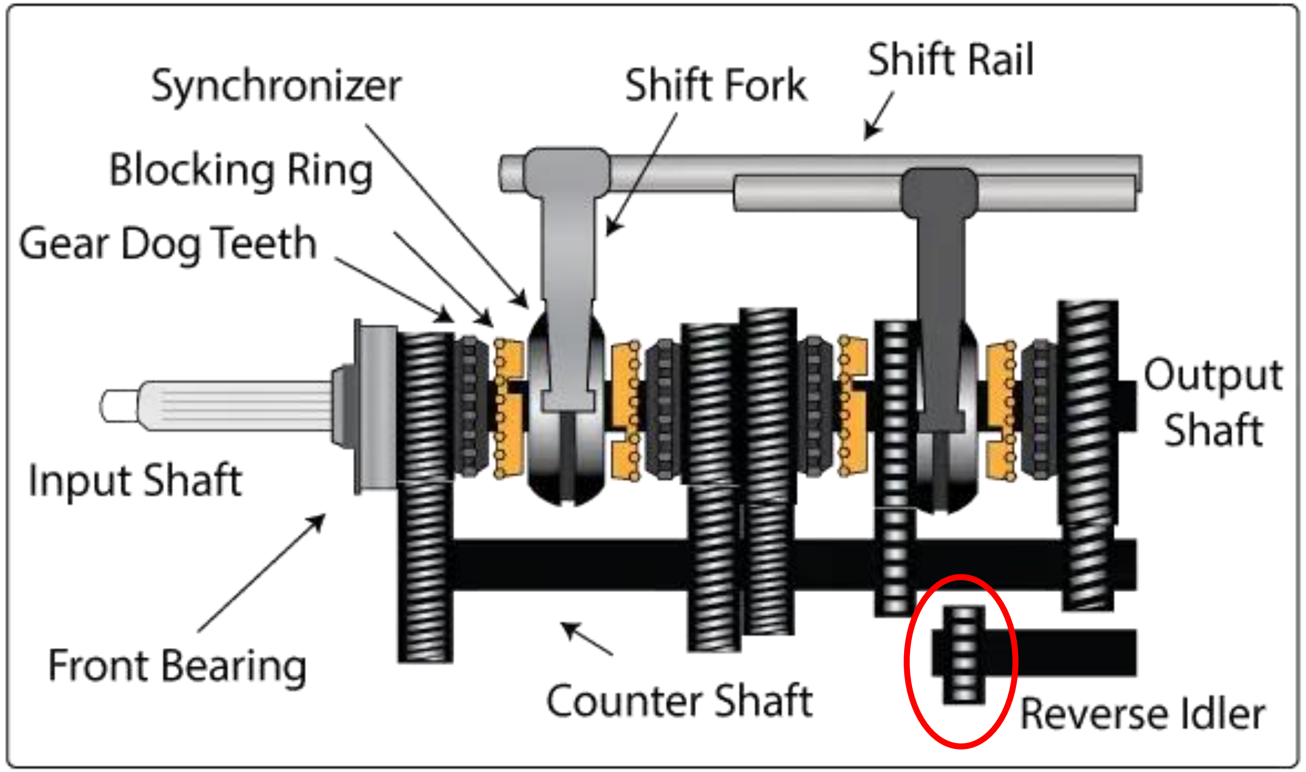
$$U = \frac{40}{20} * \frac{40}{20} = 4$$



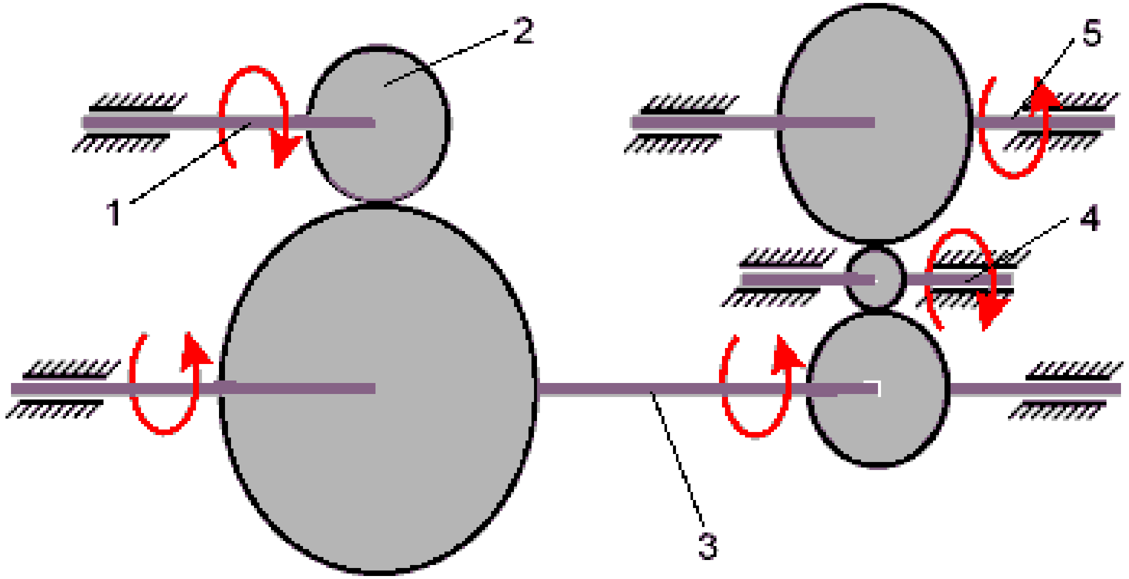
$$U_2 = \frac{z_4}{z_3} = \frac{40}{20} = 2$$

[11]

Burovchi moment yo‘nalishining o‘zgarishi.



[12]



[13]

1-yetaklovchi vali; 2-yetakchi shesternya;

3-oraliq val; 4-orqaga yurish shesternyasi;

5-yetaklanuvchi val.

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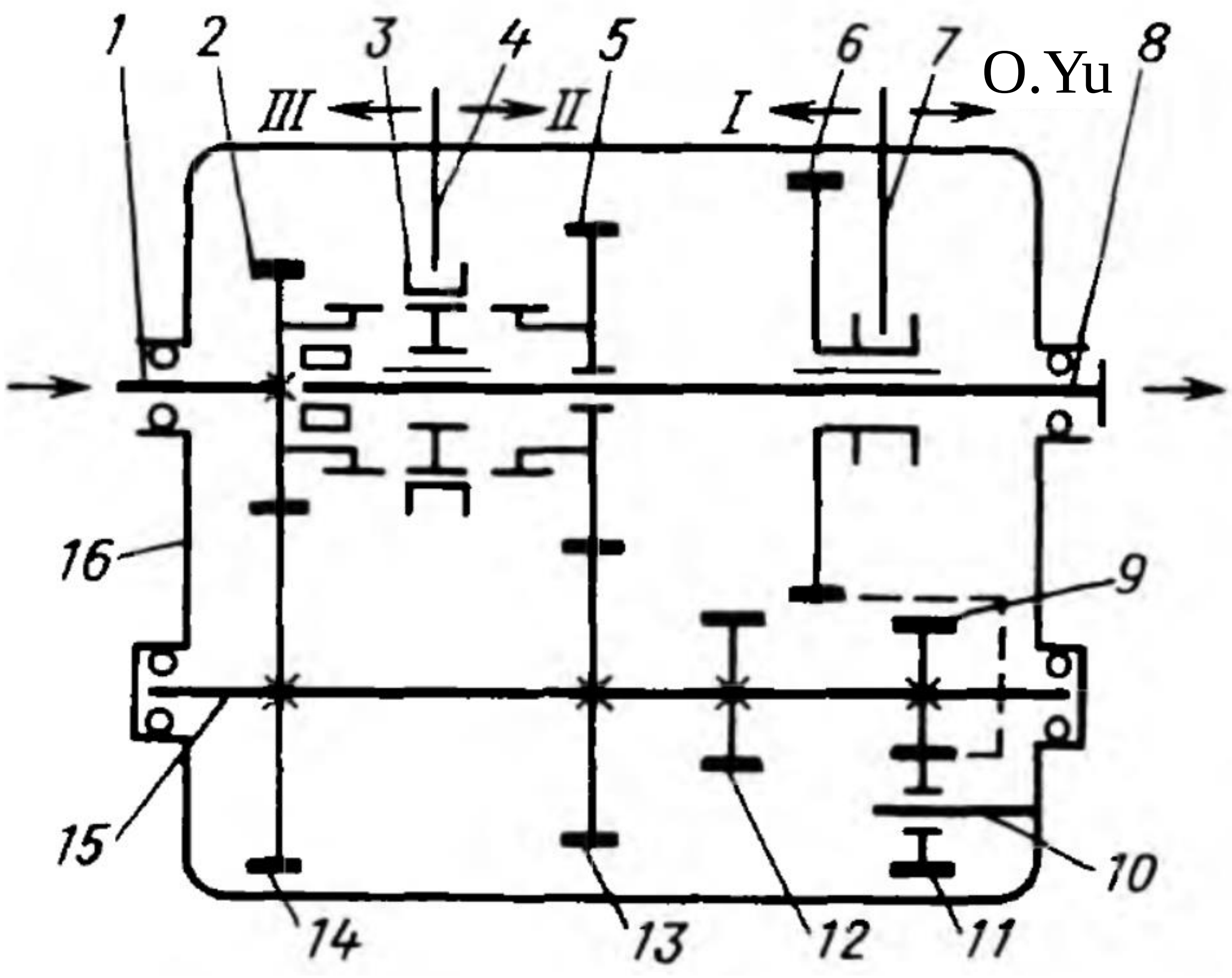
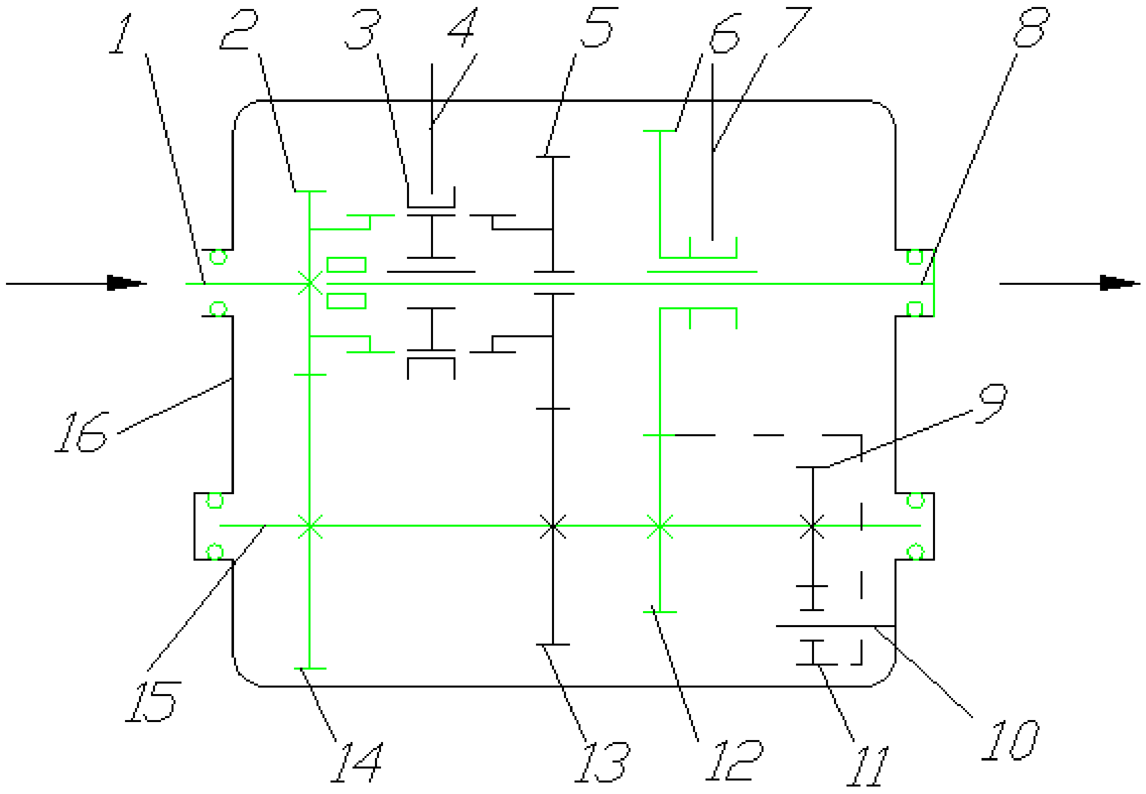
Uch pog‘onali uzatmalar qutisining konstruktiv sxemasi.



[13]

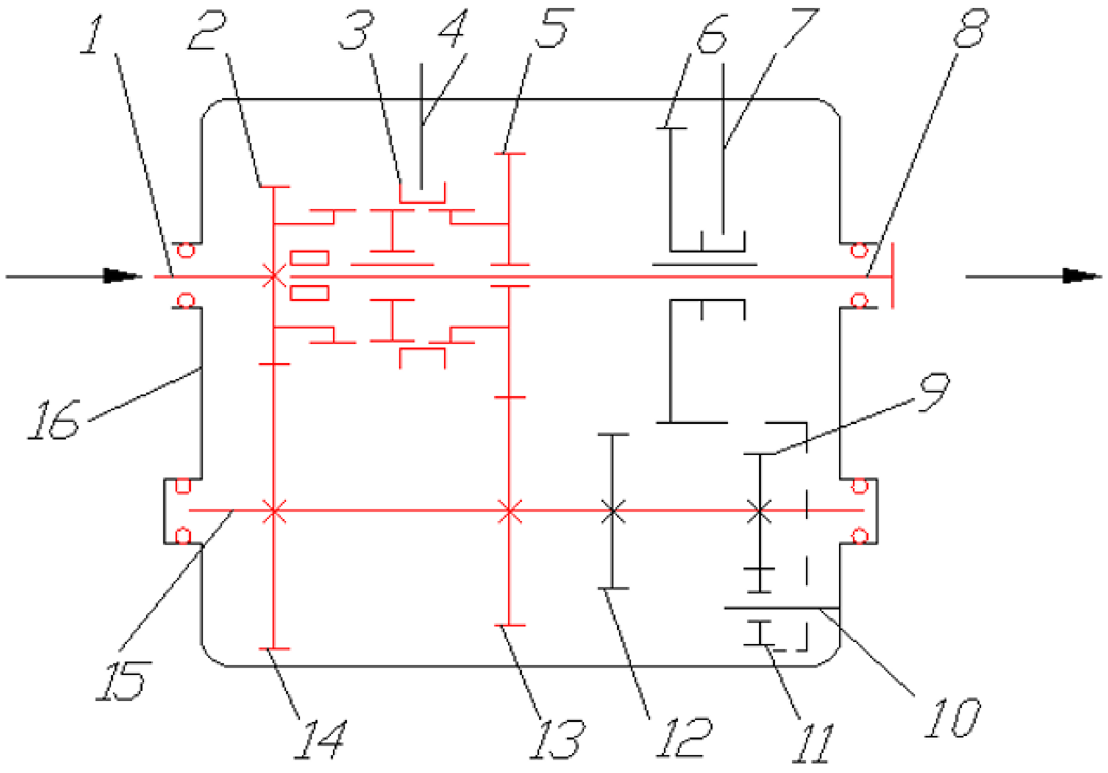
1-birlamchi (yetakchi) val, 2-birlamchi valni doimiy ilashishda turgan shesternyasi, 3-tishli mufta, 4,7-vilkalar, 5-g‘ildirak, 6-yetaklanuvchi valning g‘ildirak-karetkasi, 8-yetaklanuvchi (ikkilamchi) val, 9-O.Yu. shesternyasi, 10-o‘q, 11-doimiy ilashishda bo‘lgan shesternyasi, 12,13-shesternyalar, 14-doimiy ilashishda turgan oraliq val g‘ildiragi, 15-oraliq val, 16-karter.

UQ 1-pog‘onada ishlashi.



$$U_1 = \frac{z_{14}}{z_2} * \frac{z_6}{z_{12}} = \frac{38}{24} * \frac{40}{18} = 3,51$$

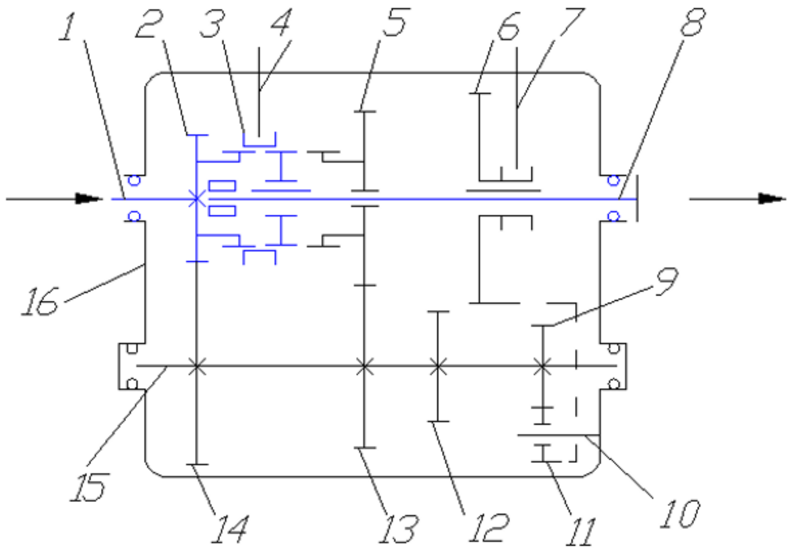
UQ 2-pog‘onada ishlashi.

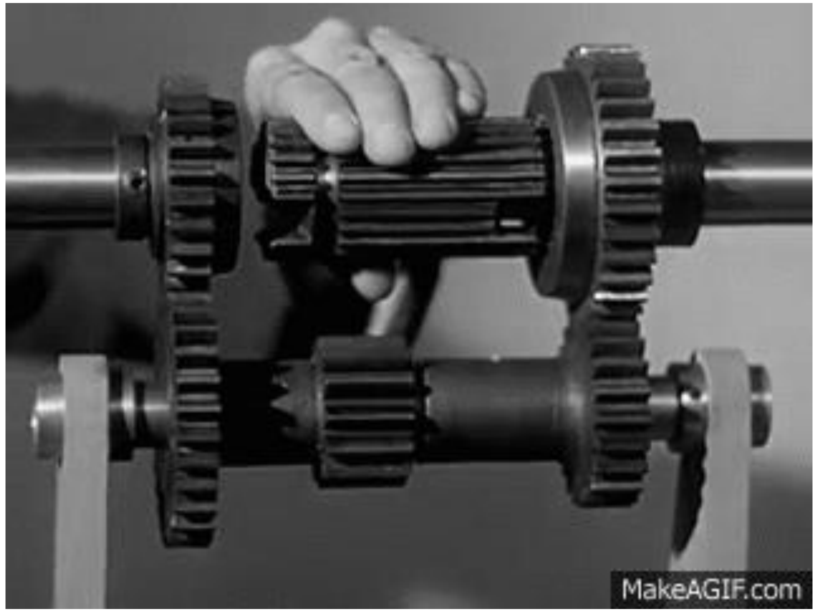


$$U_2 = \frac{z_{14}}{z_2} * \frac{z_5}{z_{13}} = \frac{38}{24} * \frac{33}{31} = 1,68$$

[13]

UQ 3-pog‘onada ishlashi.

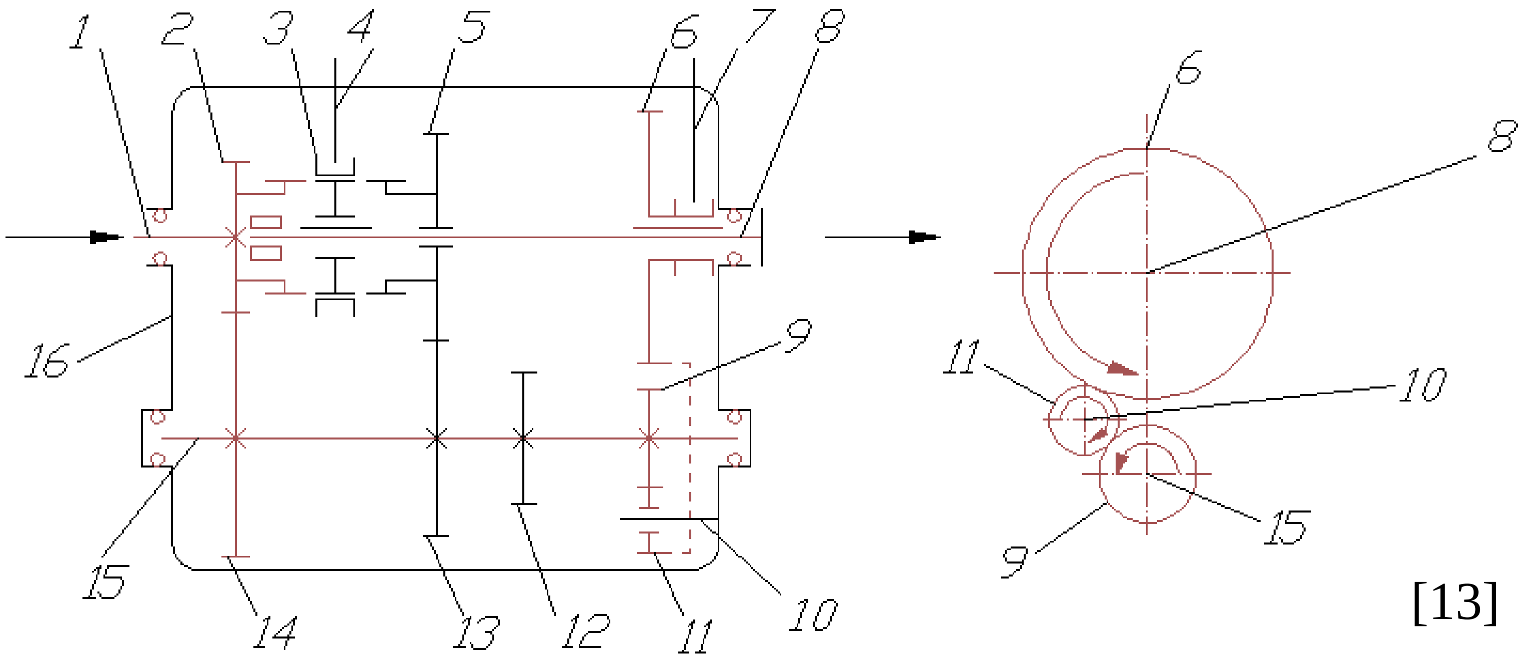




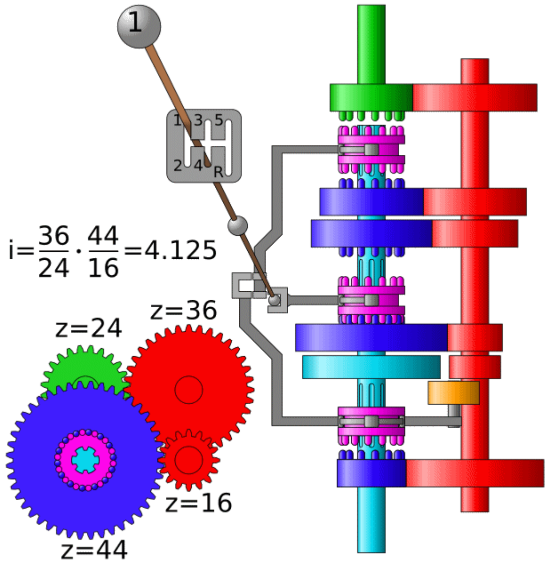
[14]

$$U_3 = \frac{z_1}{z_8} = \frac{38}{38} = 1,0$$

UQ ni orqaga yurishida ishlashi.

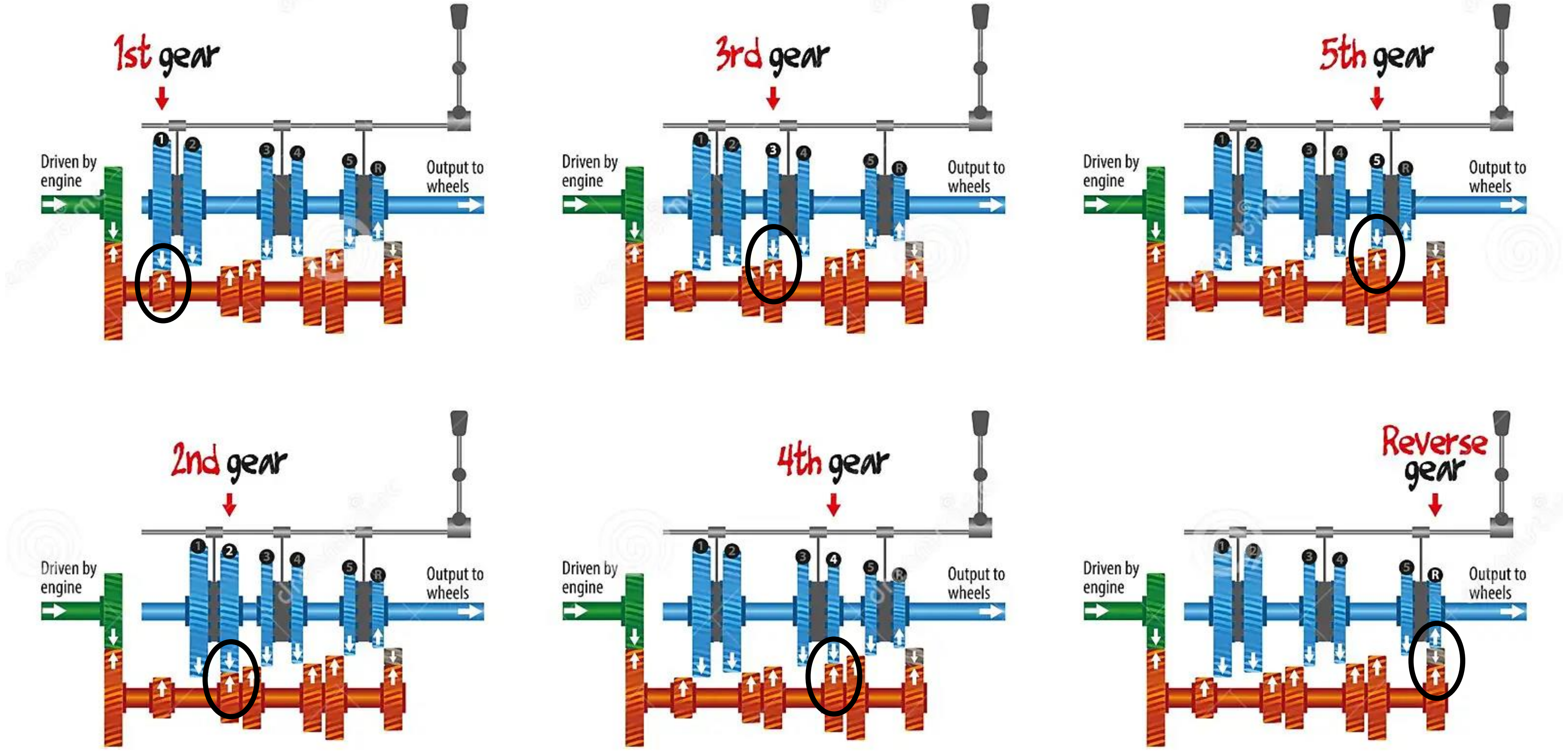


[13]



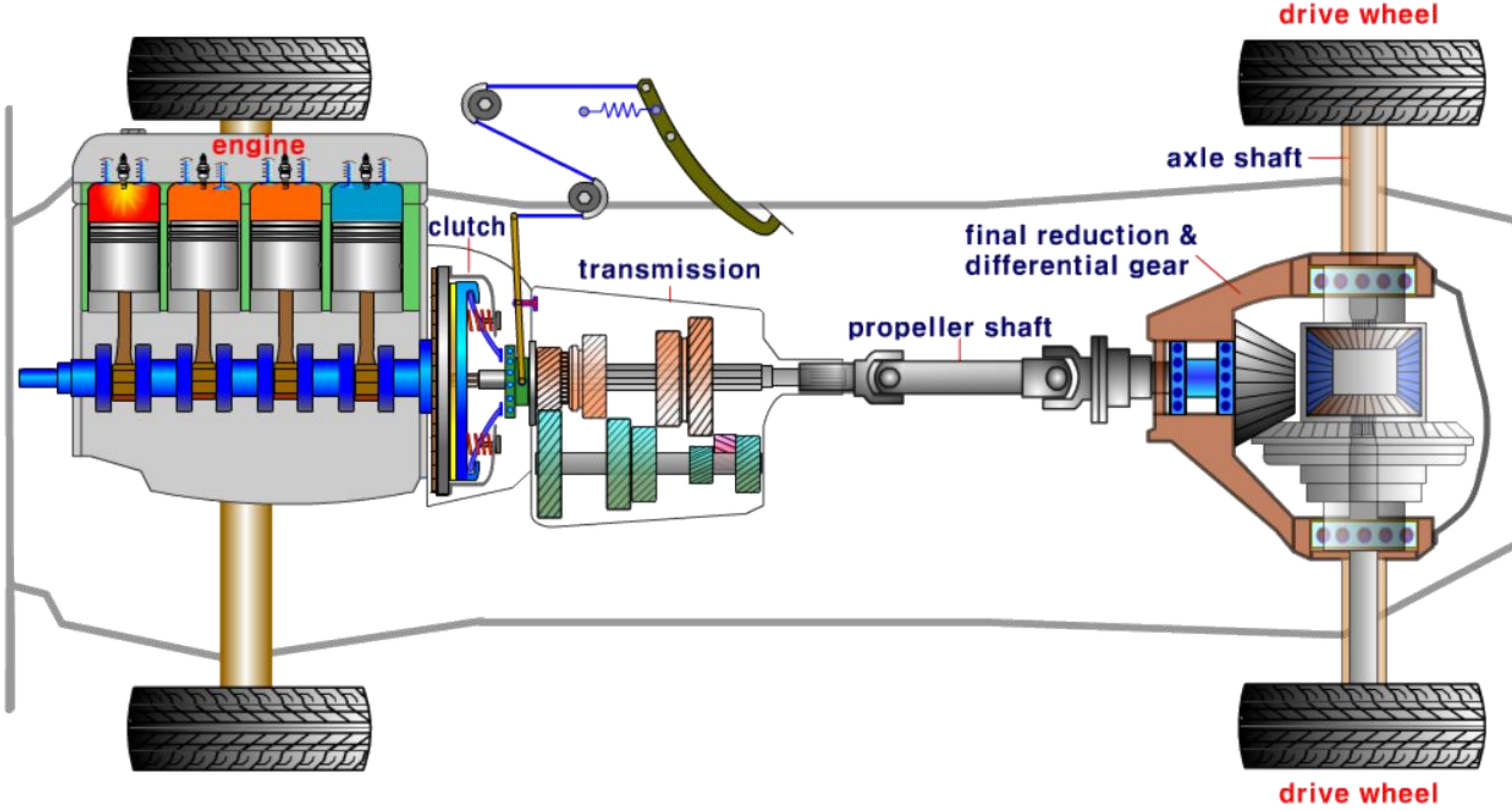
[15]

UQ ning har bir pog‘onalarda ishlashi.

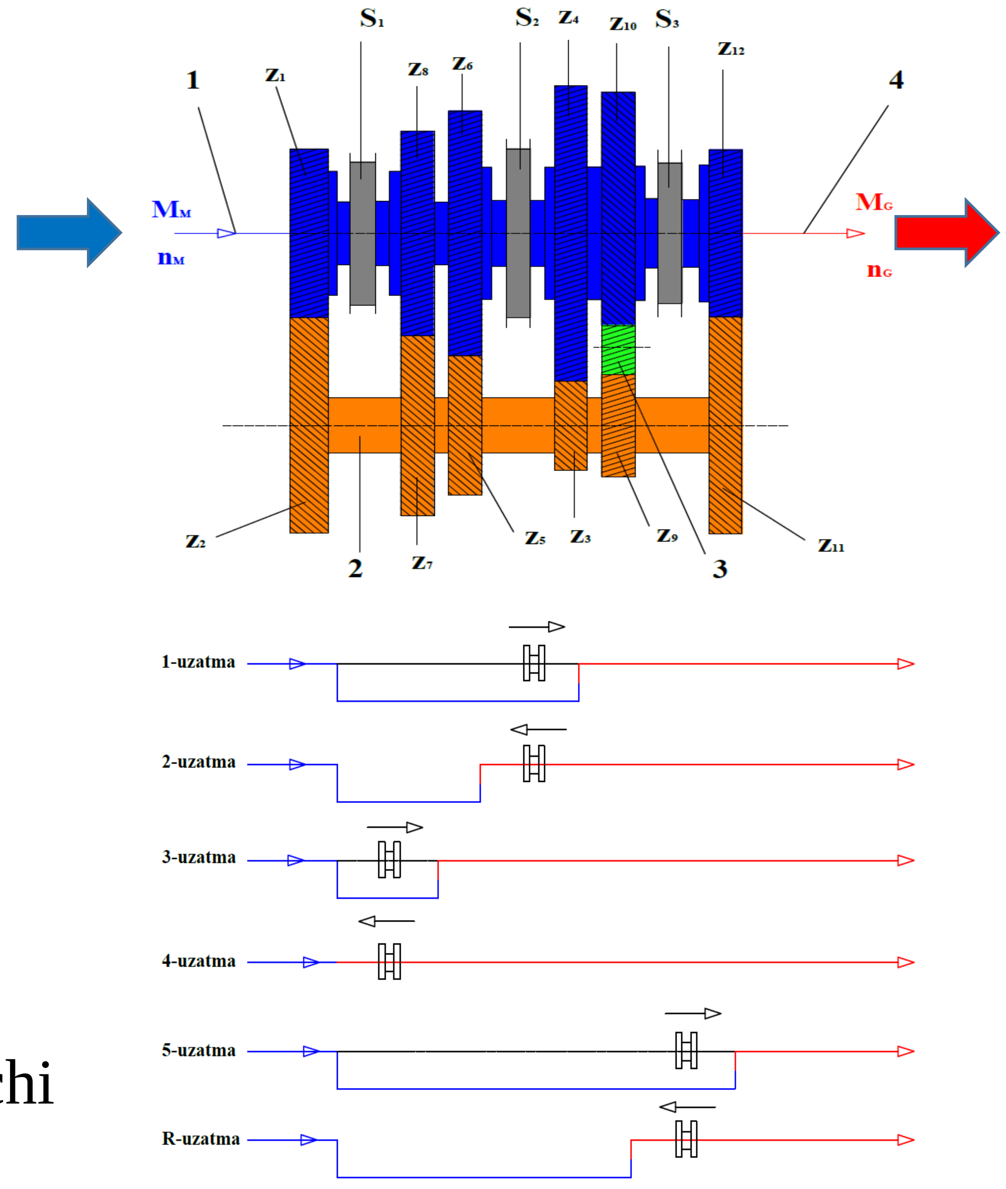


[16]

O‘qlari bir o‘qda bo‘lgan 5-pog‘onali uzatmalar qutisi.



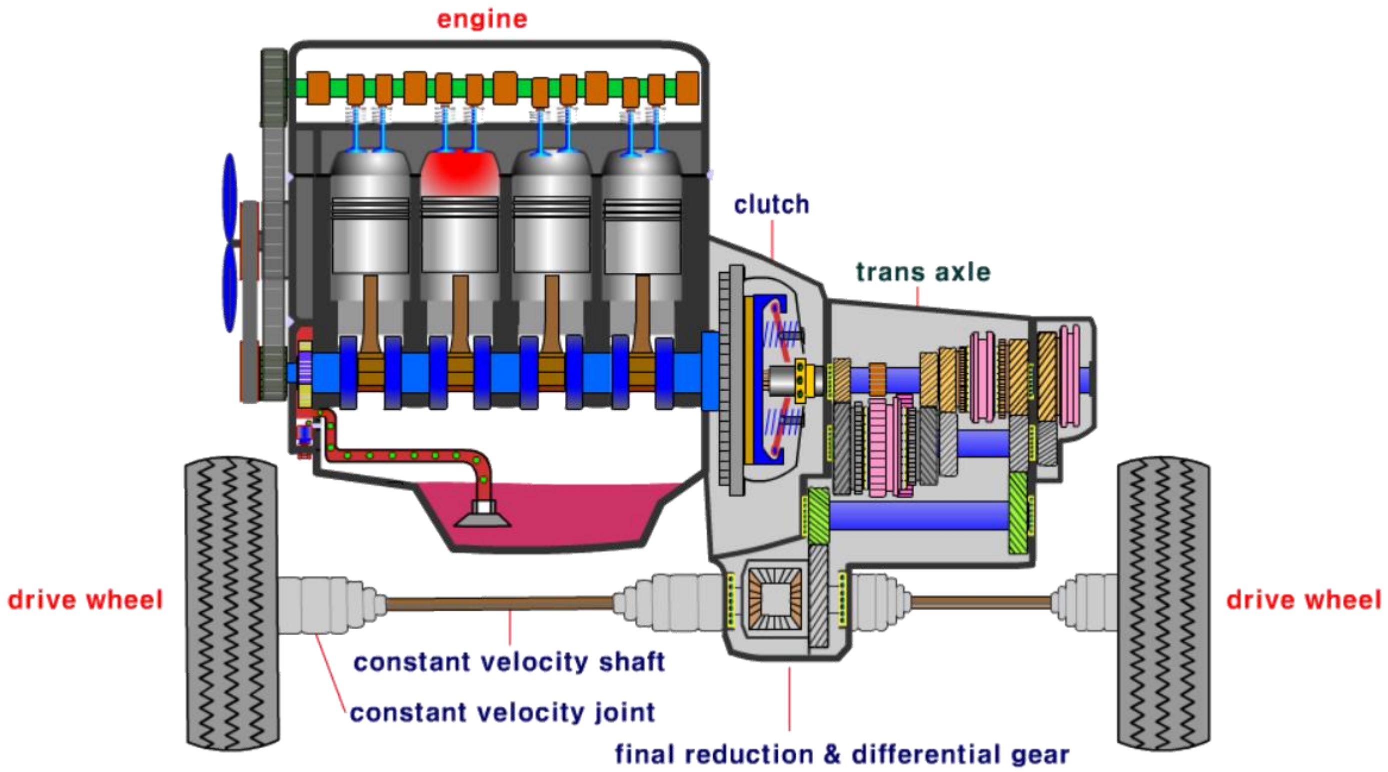
[2]



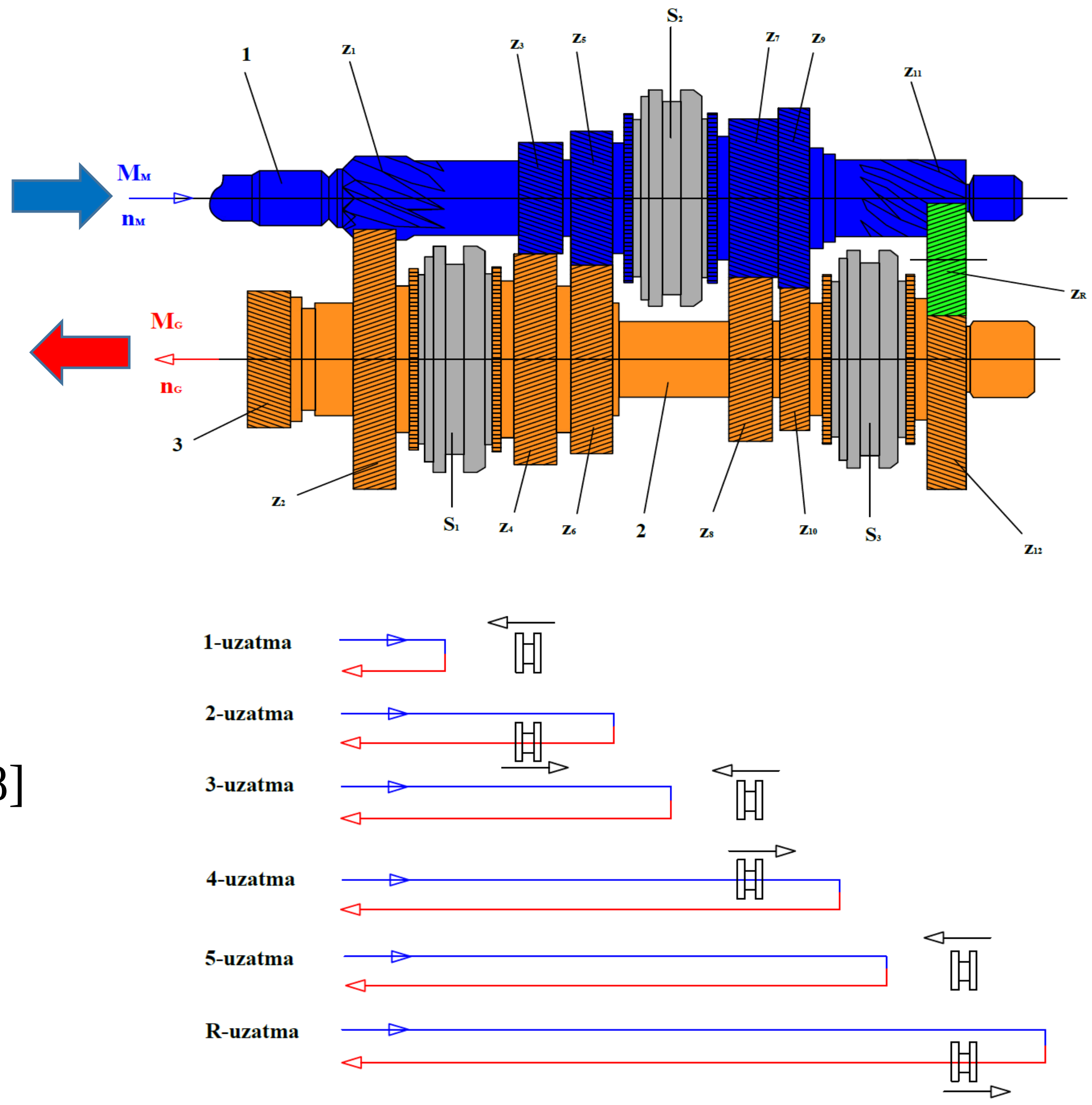
[17]

1-kuch uzatuvchi val, 2-ikkilamchi val, 3-orqaga harakatlantiruvchi tishli g‘ildirak, 4-asosiy uzatmaga harakat beruvchi val.

O‘qlari bir o‘qda bo‘lmagan 5-pog‘onali uzatmalar qutisi.



[18]

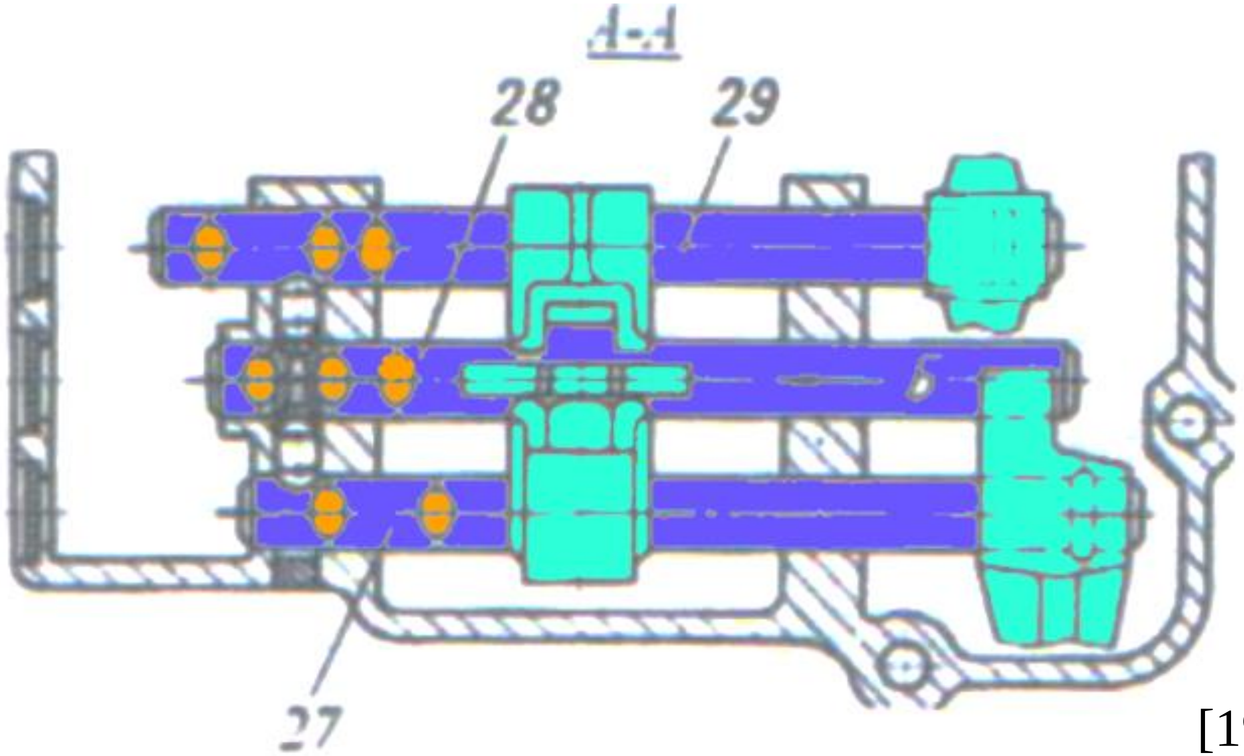


[17]

1-kuch uzatuvchi val, 2-ikkilamchi val, 3-orqaga harakatlantiruvchi tishli g‘ildirak, 4-asosiy uzatmaga harakat beruvchi val.

Pog‘onali uzatmalar qutisining pog‘ona o‘zgartirish mexanizmlarida yordamchi moslamalar qo‘llaniladi:

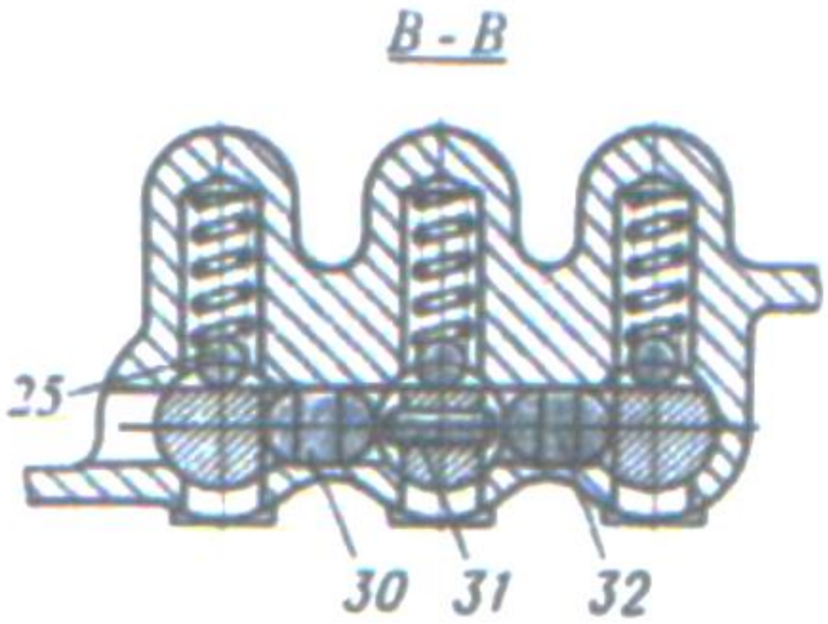
1. Fiksatorlar — avtomobil harakati davomida pog‘onalarning o‘z-o‘zidan ishga tushishi yoki pog‘onadan chiqib ketish oldini olib, pog‘onaning turg‘unligini ta’minlash uchun xizmat qiladi;



27, 28, 29 – polzunlar.

[19]

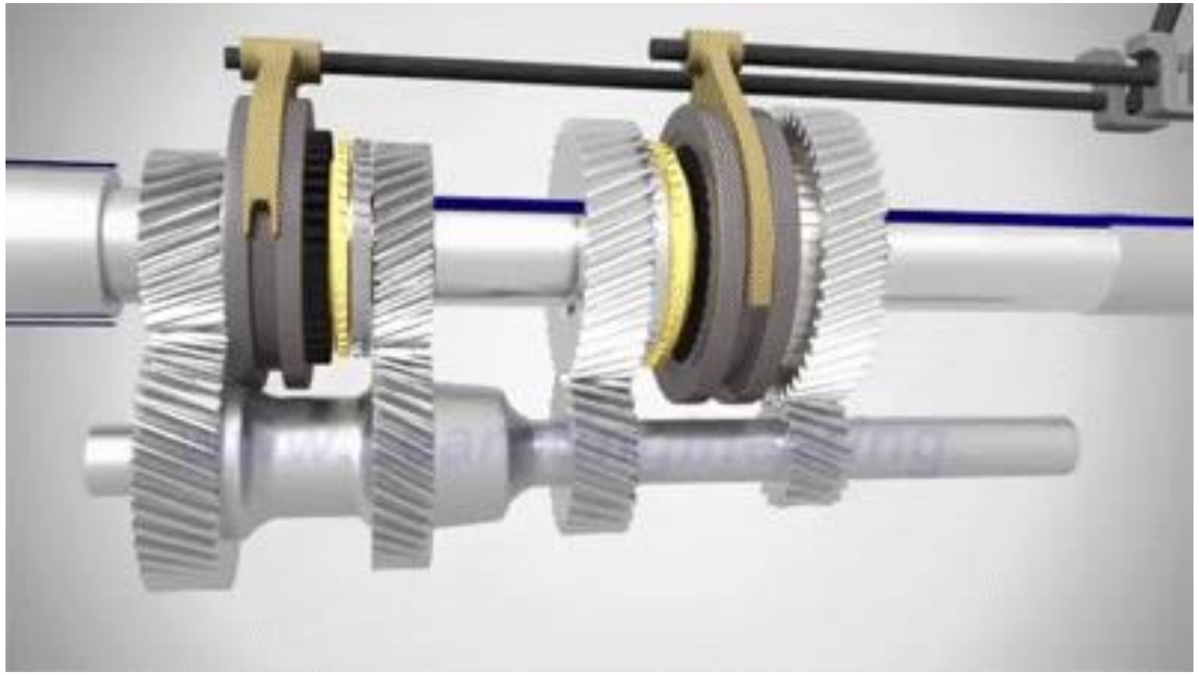
2. Orqaga yurish pog‘onasini ishga tushirishni qiyinlashtiruvchi moslama, avtomobil oldinga harakat qilayotgan vaqtda orqaga yurish pog‘onasini noto‘g‘ri ishga tushirilishini blokirovka qiladi;



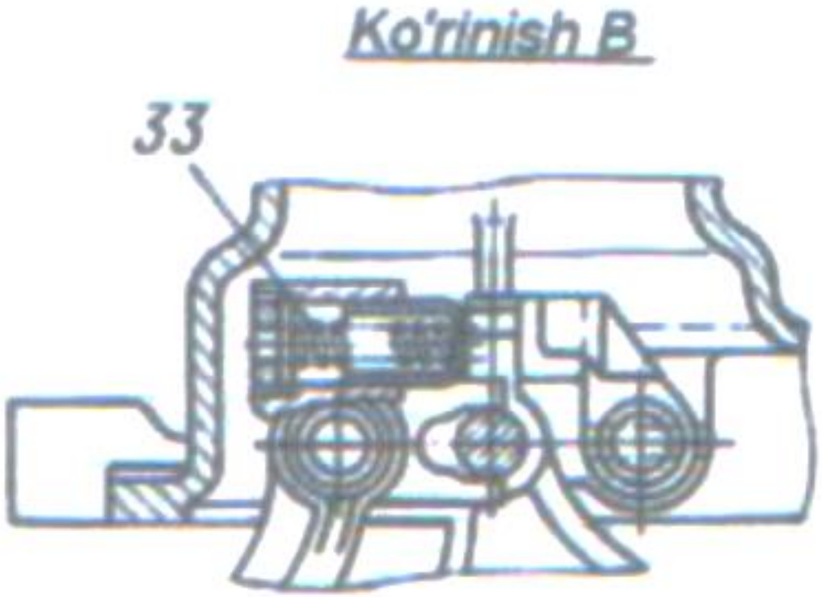
25-fiksator; 30,32-suxarlar; 31-shtift.

[19]

3. Qulf — bir vaqtning o‘zida ikki pog‘onani ishga tushishining oldini oladi.



[20]

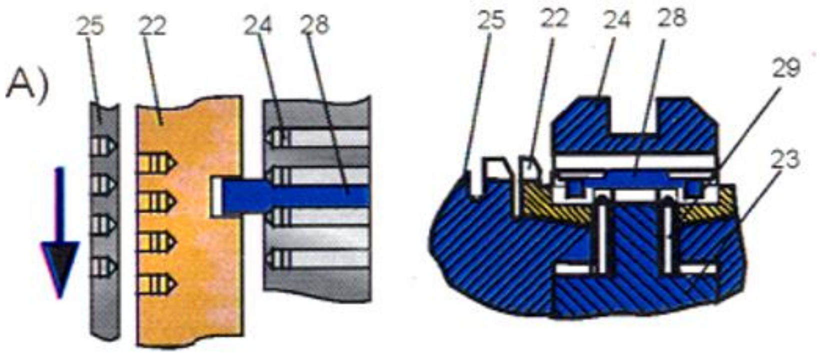


[19]

33-saqlagich prujina.

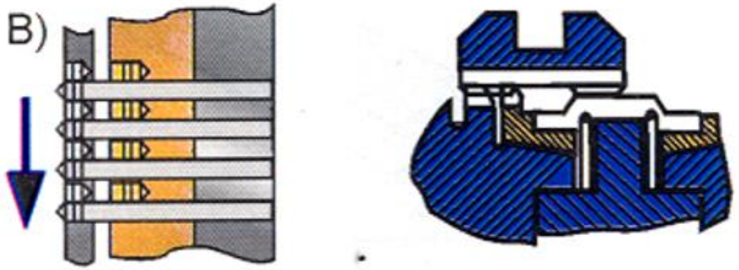
Sinxronizator.

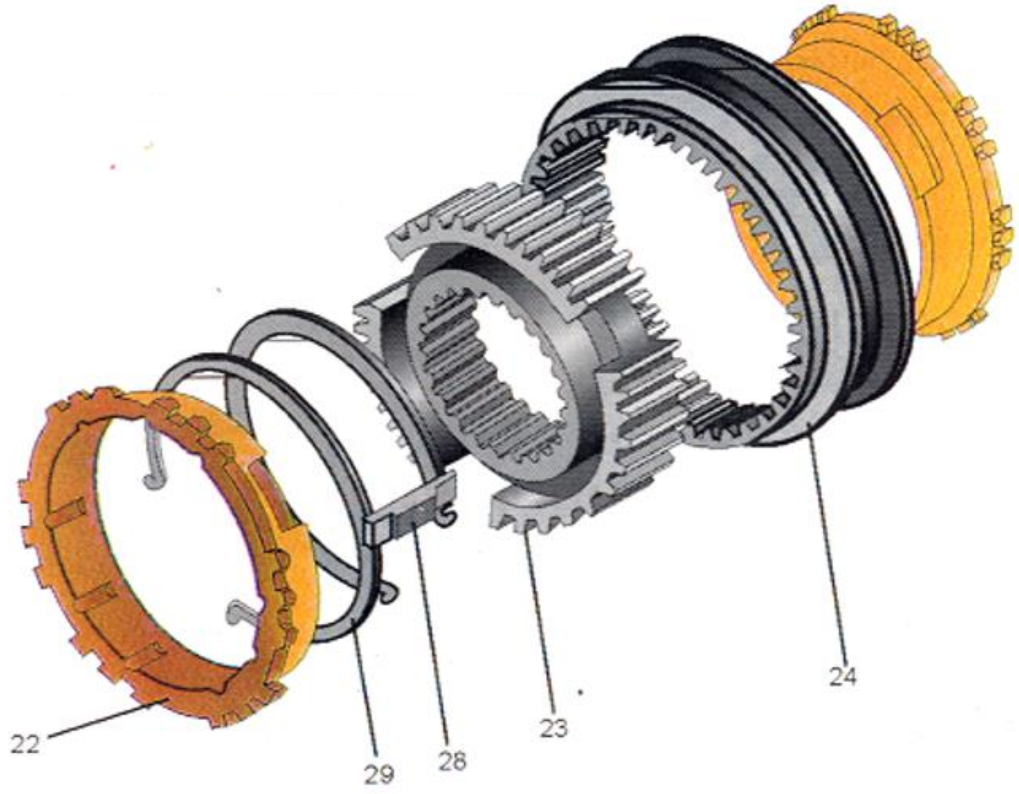
Uzatmalarning neytral holati.



Sinxronizatsiyalashning boshlanishi.

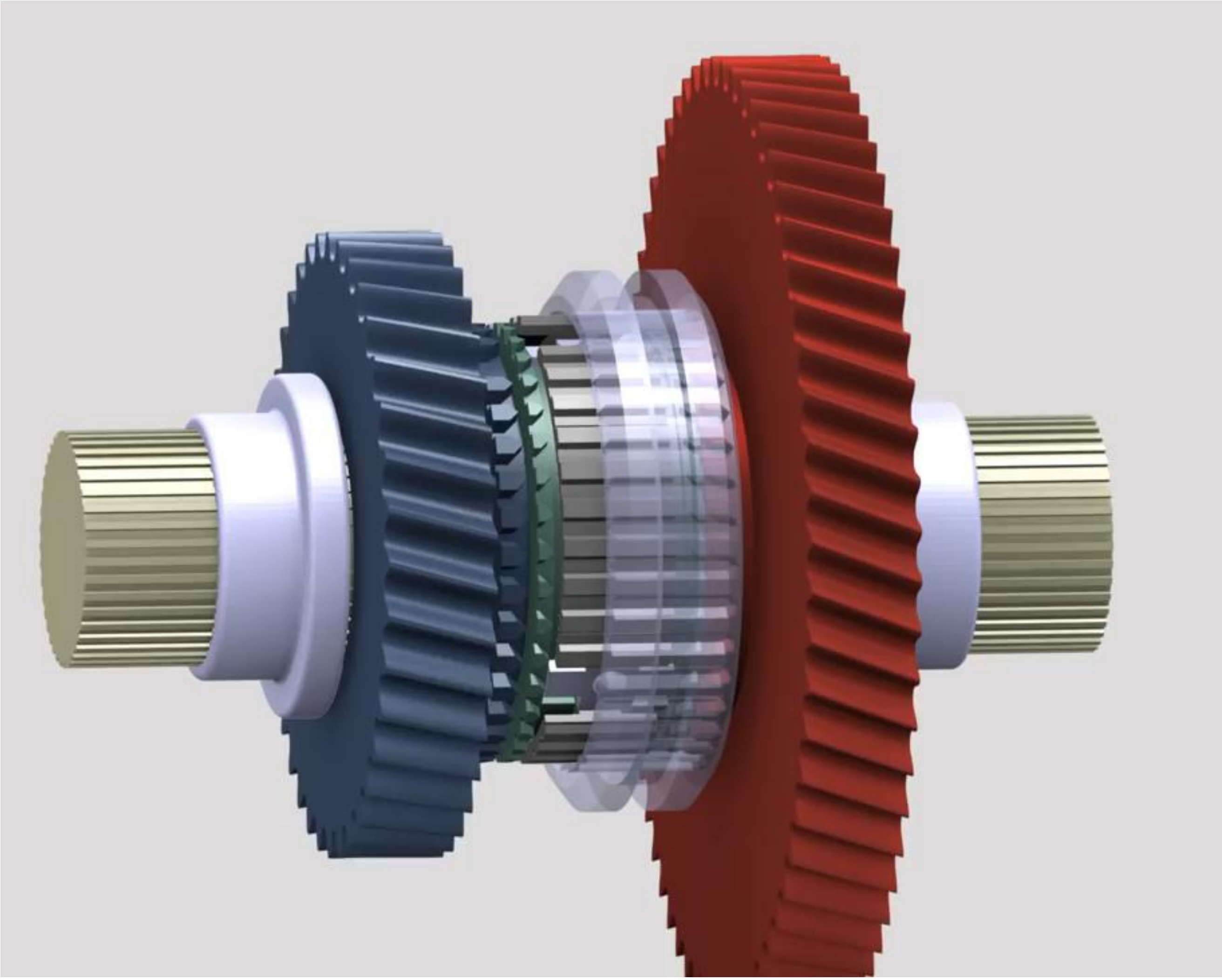
Uzatma qo‘shilganda.



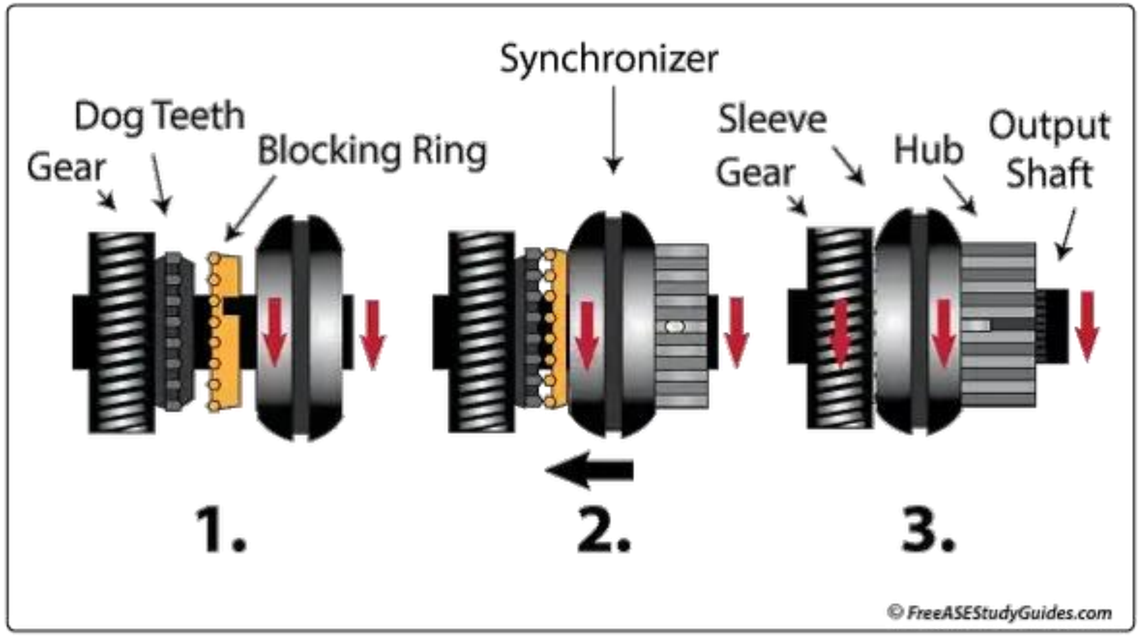


22 - 3- va 4- uzatmalar sinxronizatorining blokirovkalovchi halqalari,
23 - 3- va 4- uzatmalar sinxronizatorining gipchagi,
24 - 3- va 4- uzatmalar sinxronizatorining sirpanuvchi muftasi,
25 – 4- uzatmaning yetaklanuvchi shesternyasi,
28 – sinxronizator suxari, 29 - sinxronizator prujinasi. [21]

Sinxronizator.



[23]



[22]

FOYDALANILGAN ADABIYOTLAR

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