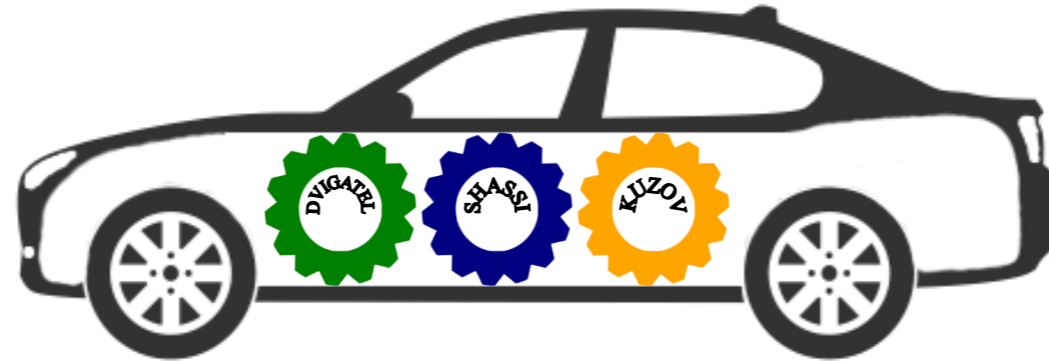


VEHICLES CONSTRUCTION

AVTOMOBILLAR KONSTRUKSIYASI



4th Topic: Valve control mechanism

(4-Mavzu: Gaz taqsimlash mexanizmi)

Part 1

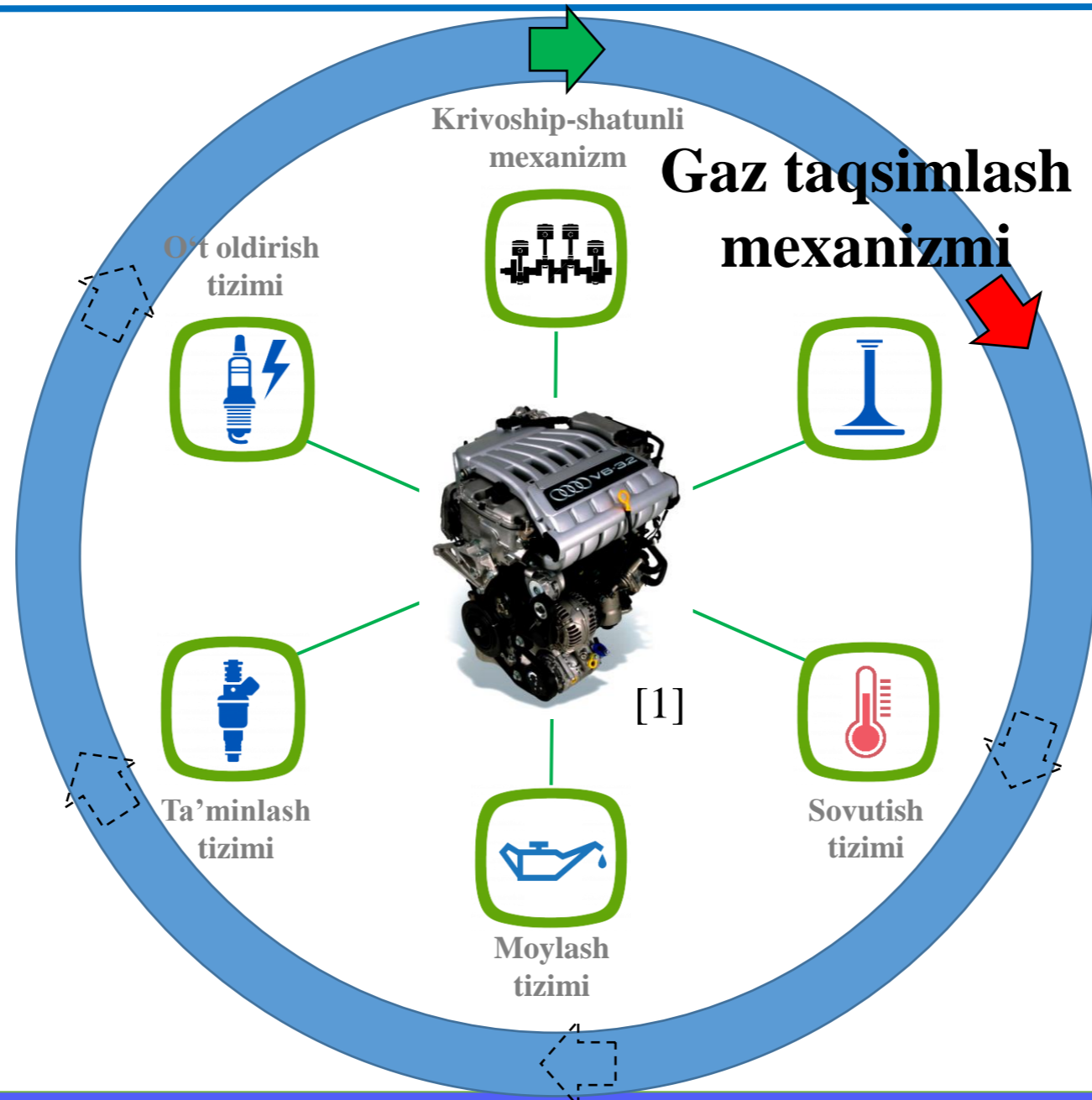
Associate Professor: Yusupov Sarvarbek

4-Mavzu: Gaz taqsimlash mexanizmi

(4th Topic: Valve control mechanism)

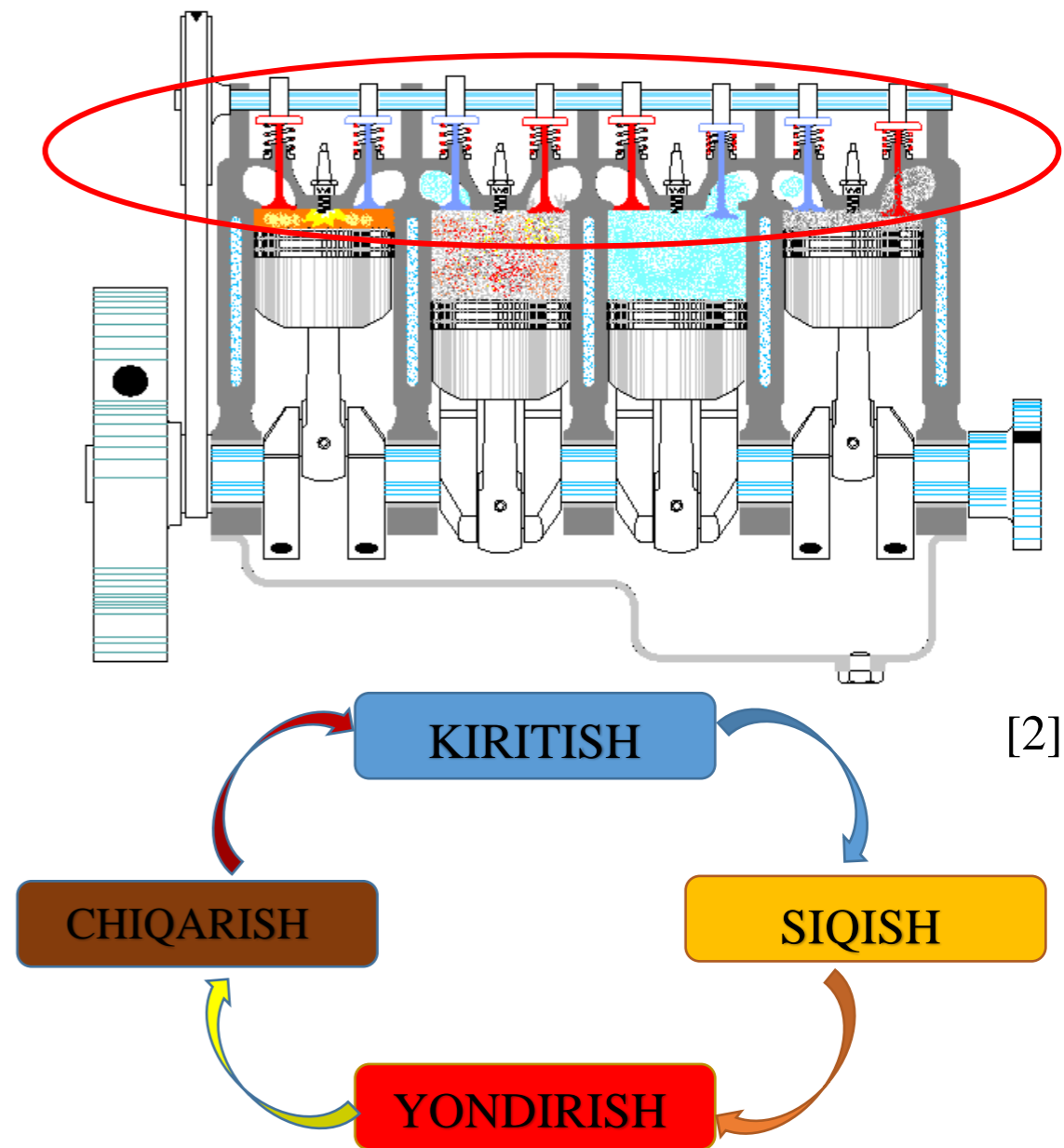
O'quv rejasini:

- 4.1. GTMning vazifasi va turlari.**
- 4.2. GTM turlarining konstruksiyasi va ularning ishlash prinsipi.**
- 4.3. GTM valining konstruksiyasi va uning yuritma turlari.**
- 4.4. GTM detallarining konstruksiyasi va ishlash prinsipi.
- 4.5. Hidrokompensator konstruksiyasi.
- 4.6. GTM fazasi va diagrammasi.



4.1. GTMning vazifasi va turlari.

Gaz taqsimlash mexanizmi - silindrga kiritish taktida yonuvchi aralashma (*benzinli va gazli dvigatellarda*) yoki havo (*dizellarda*) **kiritish**, **siqish** va **ish taktlarda** esa silindrni tashqi muhitdan cheklab qo'yish hamda **chiqarish** taktida ishlatilgan gazlarni tashqi muhitga chiqarib yuborish uchun xizmat qiladi.

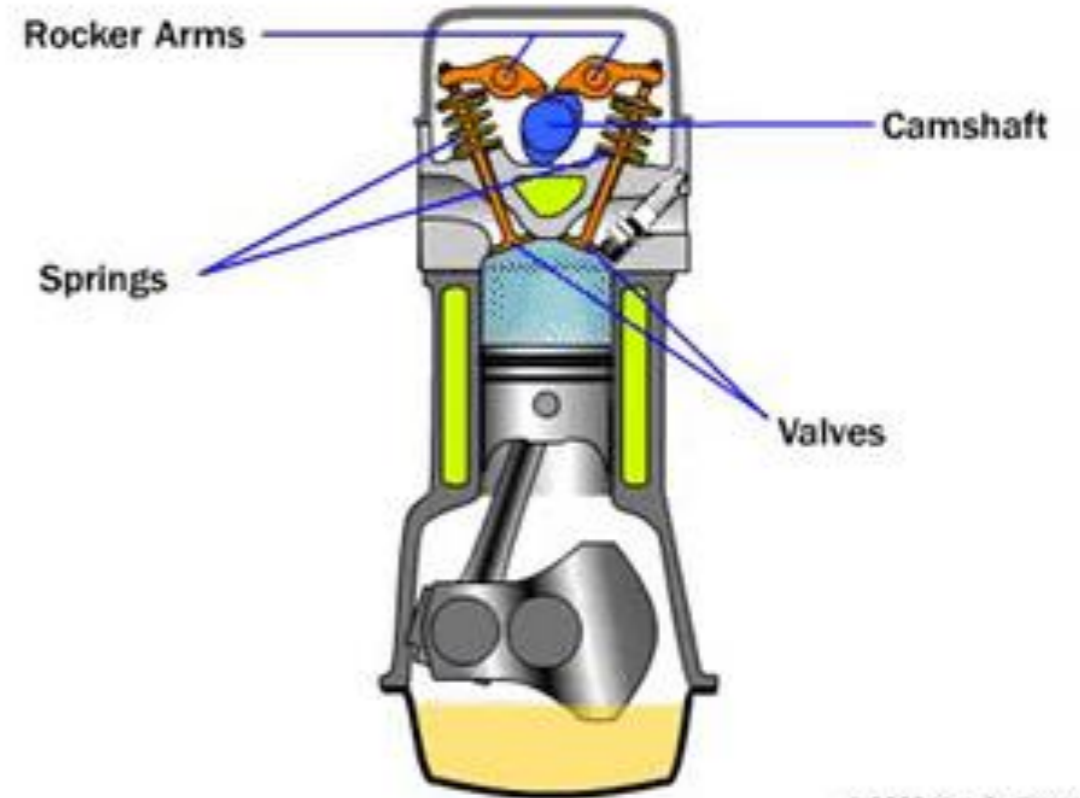
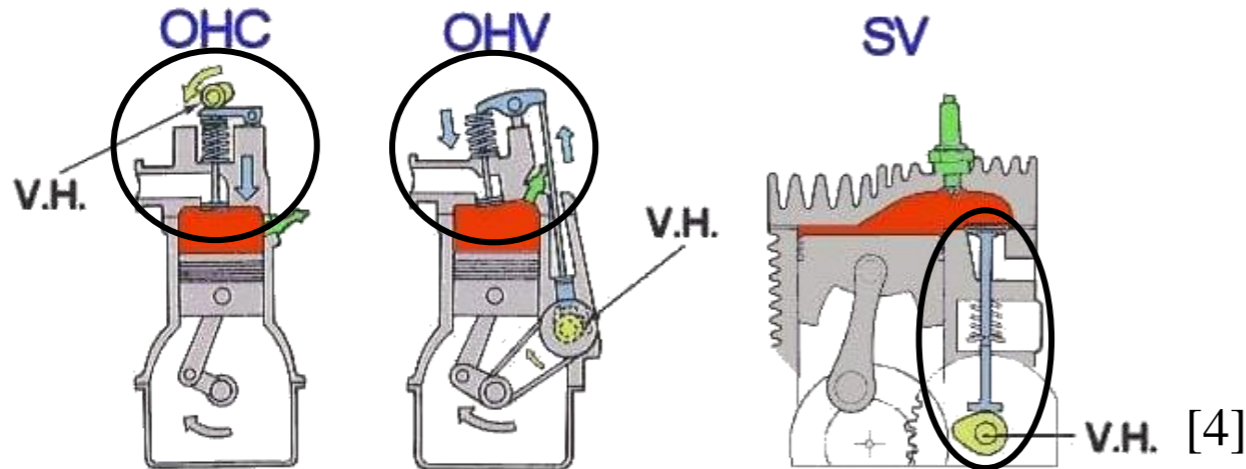


Avtomobil dvigatellariga asosan klapanli GTM o‘rnatiladi.

To‘rt taktli avtomobil dvigatellarida:

klapanlari yuqorida
(*silindr kallagida*)

klapanlari pastda
(*silindr blokini yon
tomonida*)



A single overhead cam

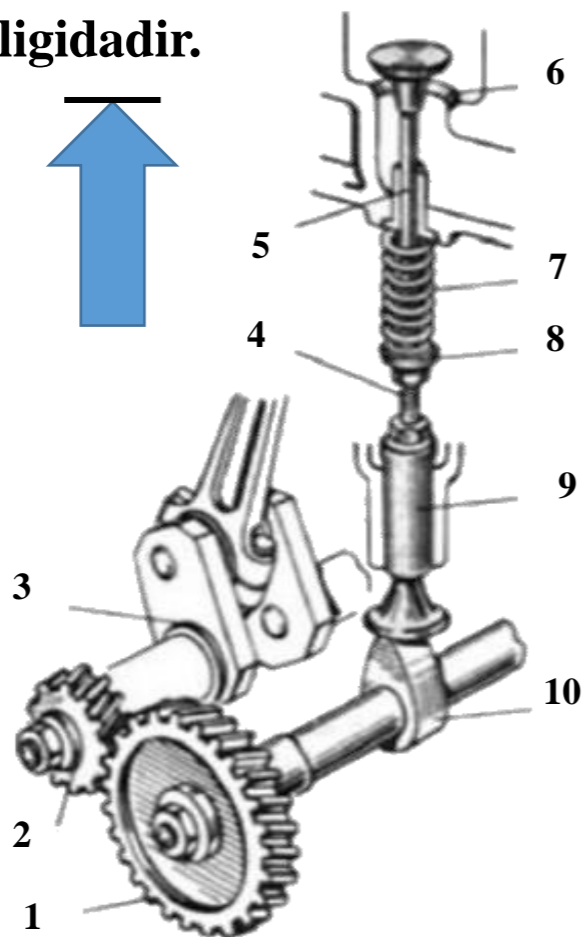
© 2000 How Stuff Works

MakeAGIF.com

[3]

KLAPANLARI

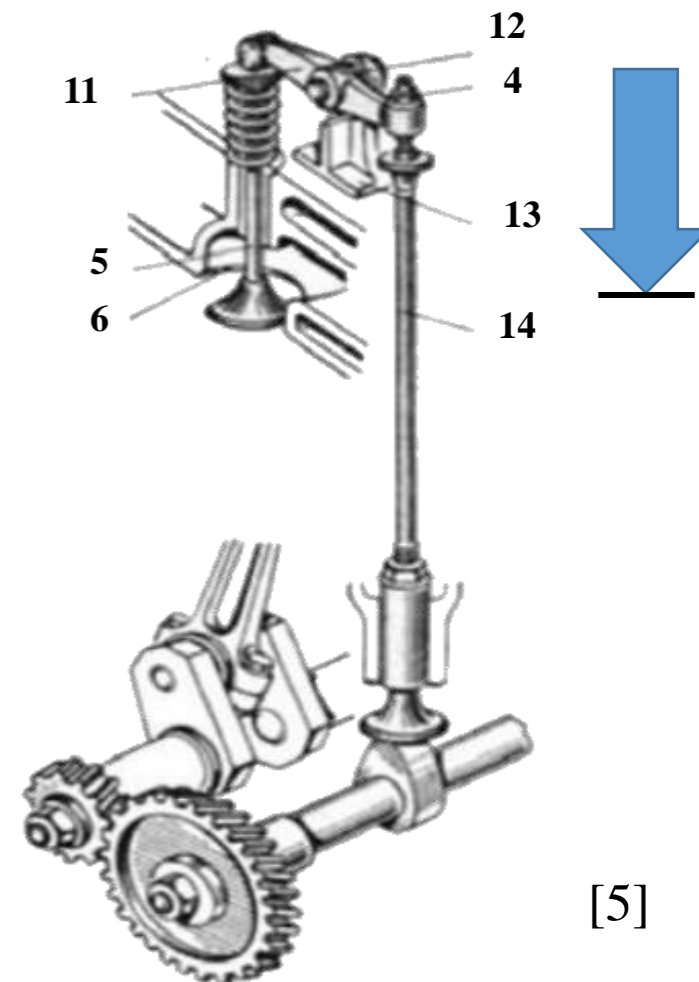
Klapanlari pastda joylashgan gaz taqsimlash mexanizmining asosiy konstruktiv xususiyati silindrlar blokida joylashganligidir.



- 1 va 2-tishli g'ildiraklar;
- 3-tirsakli val; 4-rostlash boltlari;
- 5-klapanlar; 6-o'rindiqlar;
- 7-prujina; 8-tayanch shayba;
- 9-turtkich; 10-mushtcha;
- 11-koromislo; 12-koromislo o'qi;
- 13-kronshteyn; 14-shtanga.

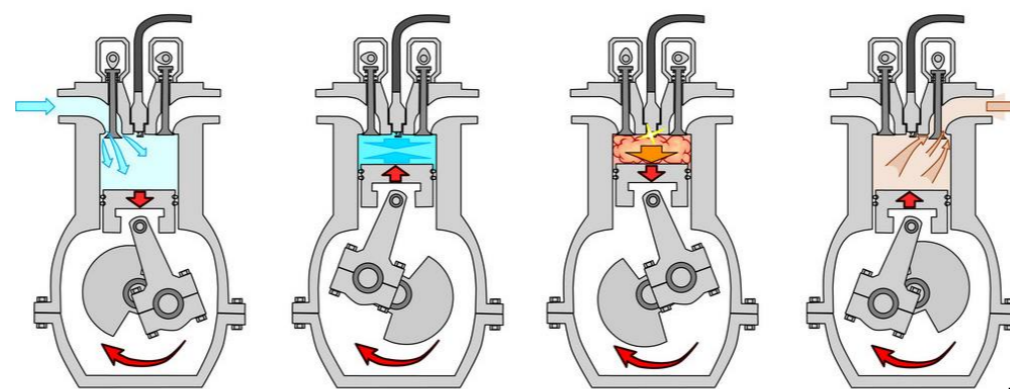
Pastda joylashgan GTM

Yuqorida joylashgan GTM



Klapanlari yuqorida joylashgan gaz taqsimlash mexanizmida esa klapanlar silindrlar kallagida bo'ladi.

Yonuvchi aralashma
yoki havoni silindrga
uzatib beruvchi klapanlar
kirituvchi



[6]

1 2 3 4

Ishlatilgan gazlarni
silindrdan tashqariga
chiqaruvchi klapanlar
chiqaruvchi

Taqsimlash valining
mushtchalari soni

shu klapanlar soniga tengishli bo‘ladi.

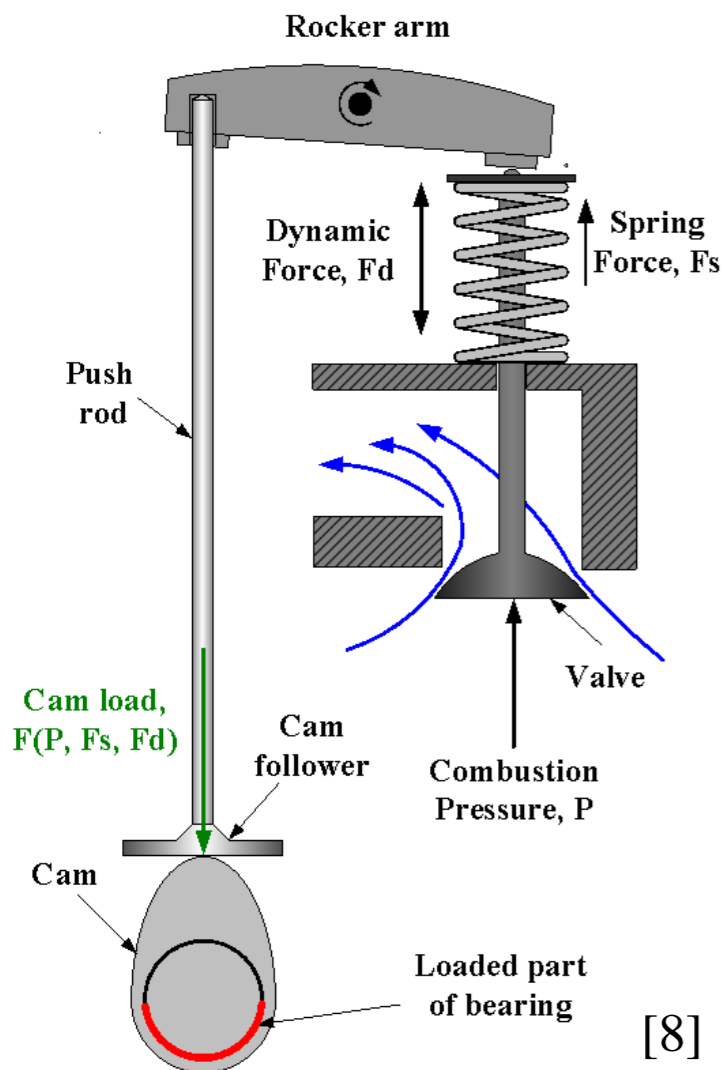
Har bir silindrda
bitta kiritish va bitta chiqarish,

To‘rt silindrli dvigatelda 8 ta,

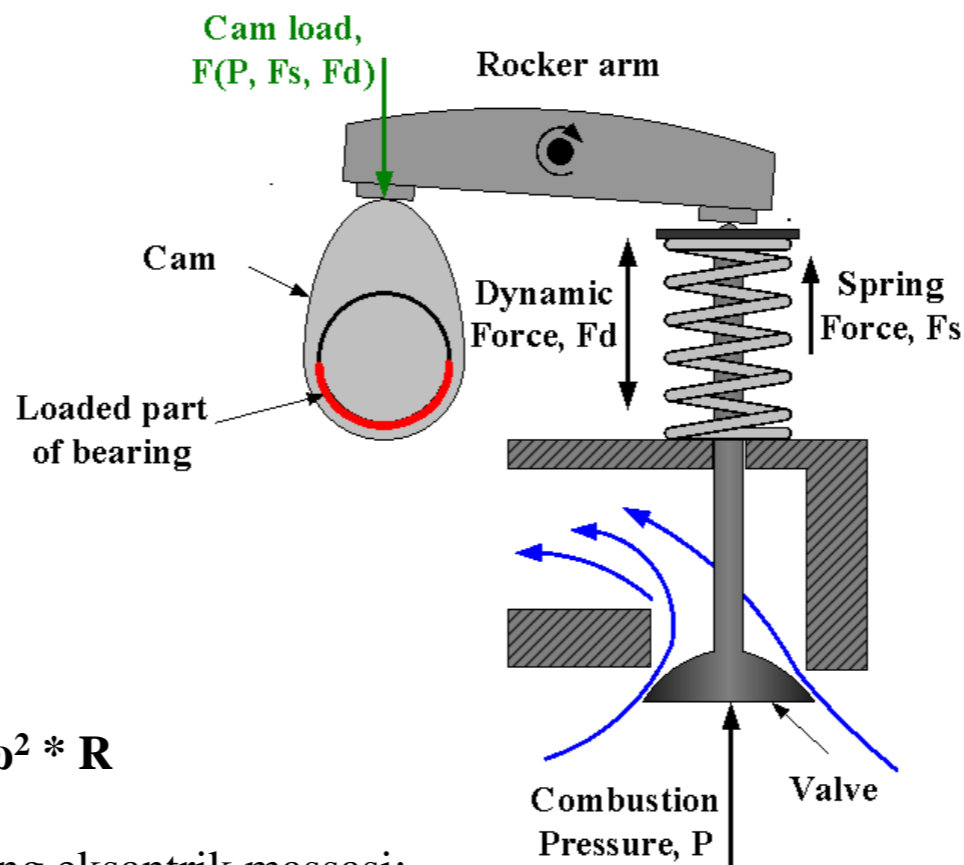
Olti silindrli dvigatelda esa 12 ta klapan bor.

4.2. GTM turlarining konstruksiyasi va ularning ishlash prinsipi.

Overhead valve (OHV) design



Overhead camshaft (OHC) design with rocker arm



$$F = M_C * \omega^2 * R$$

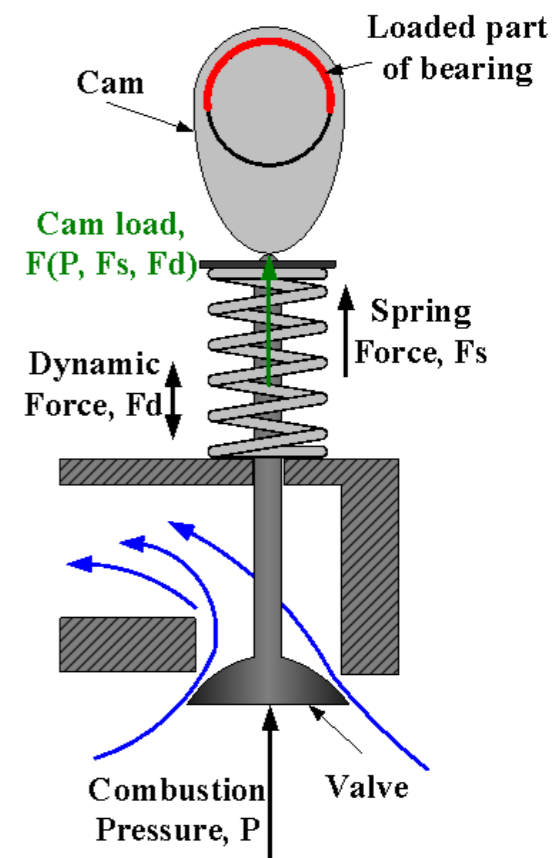
Bu yerda:

M_C – valning eksantrik massasi;

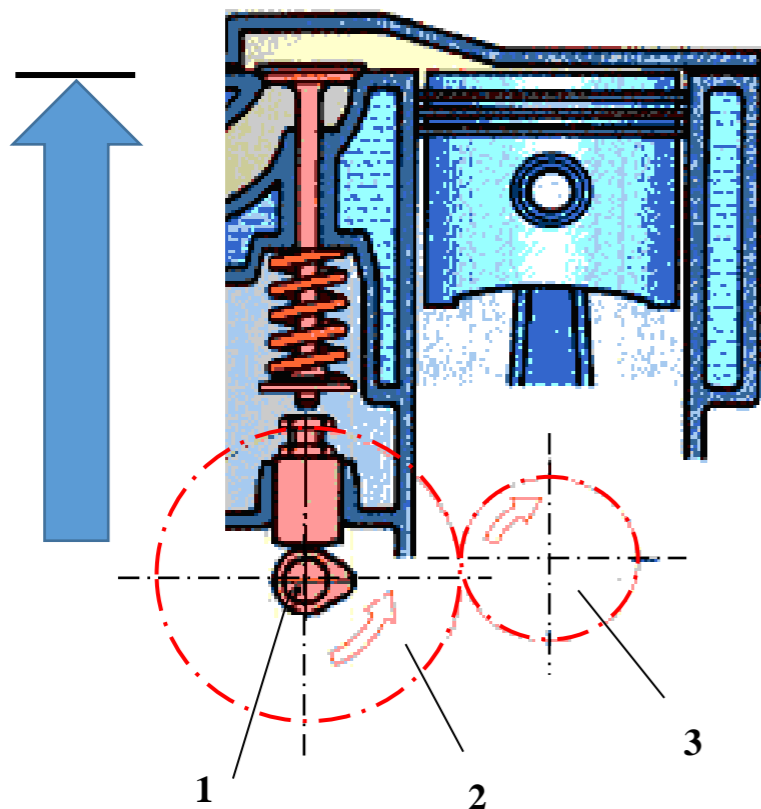
ω – aylanish tezligi;

R – valning ekssentrikligi.

Overhead camshaft (OHC) design with direct cam operation

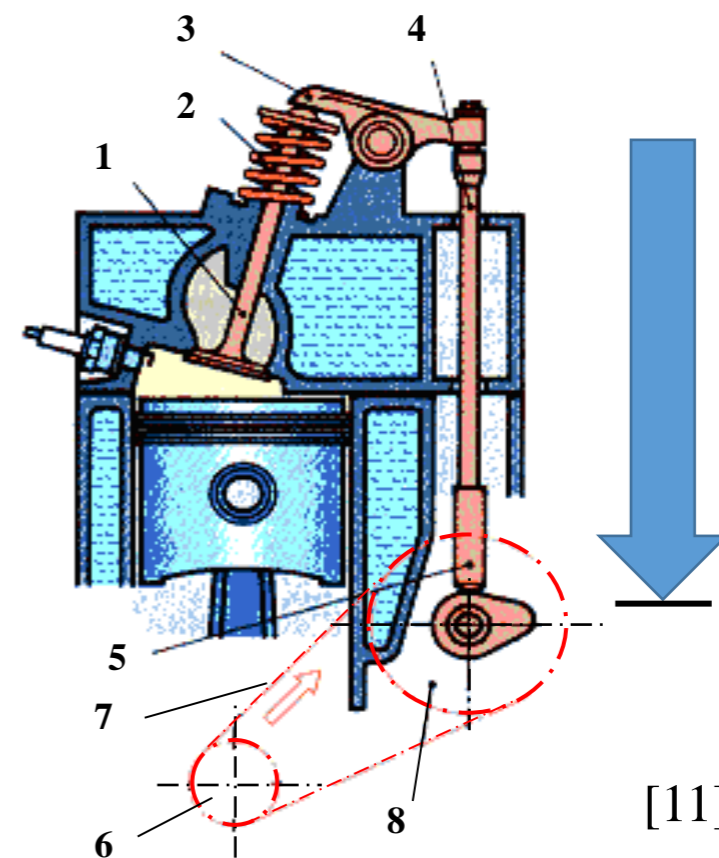


Pastda joylashgan GTM



1-gaz taqsimlash vali, 2- gaz taqsimlash valining shesternyasi, 3-tirsakli valning shesternyasi.

Yuqorida joylashgan GTRM



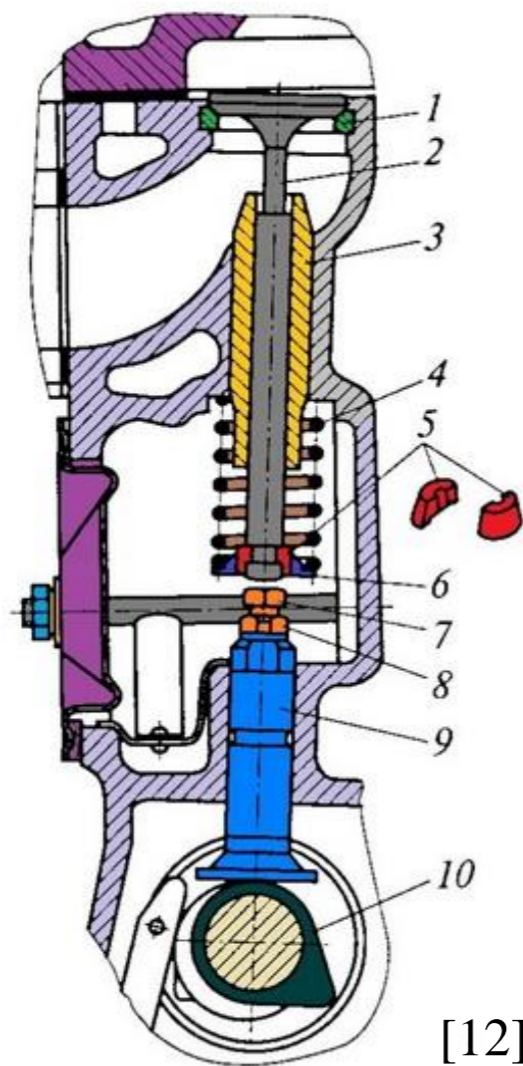
1-klapan, 2-prujina, 3-koromislo, 4-shtanga, 5-turtkich, 6- tirsakli valning shesternyasi, 7-zanjirli tasma, 8- gaz taqsimlash valining shesternyasi.

[11]

Klapanlar pastda – silindrlar blokida joylashgan gaz taqsimlash mexanizmi:

Tuzilishi:

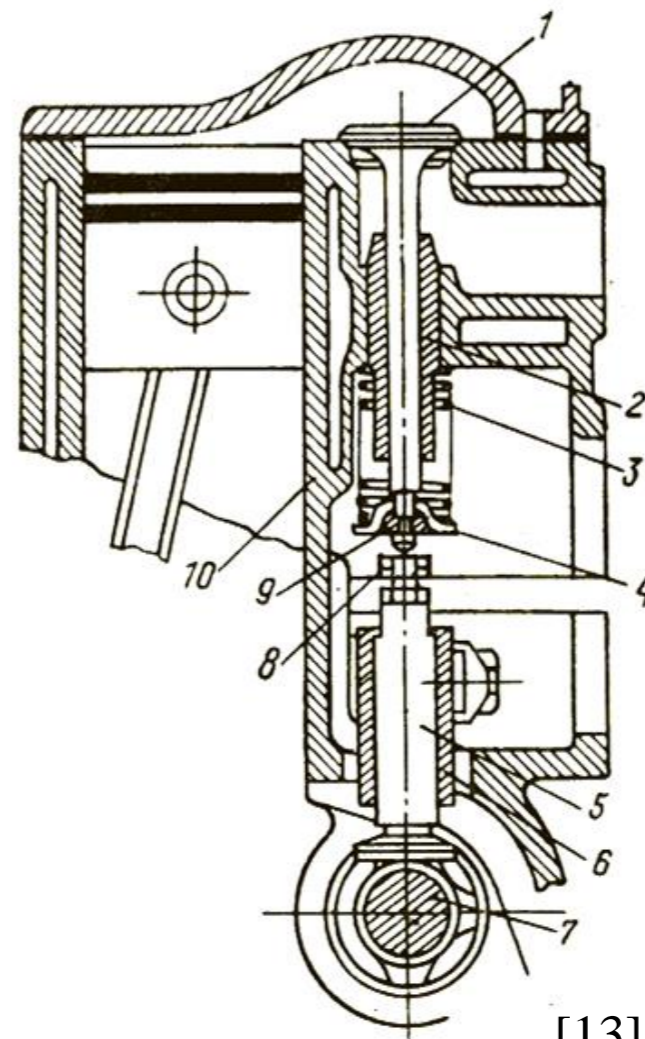
Ishlashi:



[12]

taqsimlash mexanizmi:

- 1-klapan egari;
- 2-klapan;
- 3-yo‘naltiruvchi vtulka;
- 4-prujina; 5-suxarik;
- 6-tirgak-shayba;
- 7-8-rostlash bolti;
- 9-tutrkich;
- 10- taqsimlash vali.



[13]

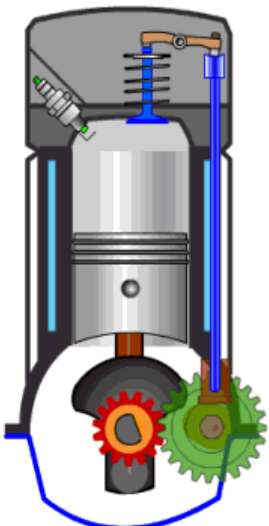
- 1-klapan;
- 2-yo‘naltiruvchi vtulka;
- 3-prujina; 4-tirgak-shayba; 5-tutrkich;
- 6-tutrkich vtulkasi;
- 7- taqsimlash vali;
- 8-rostlash bolti;
- 9-suxarik;
- 10-blok-kater.

Klapanlari yuqorida joylashgan gaz taqsimlash mexanizmi:

Tuzilishi:

Ishlashi:

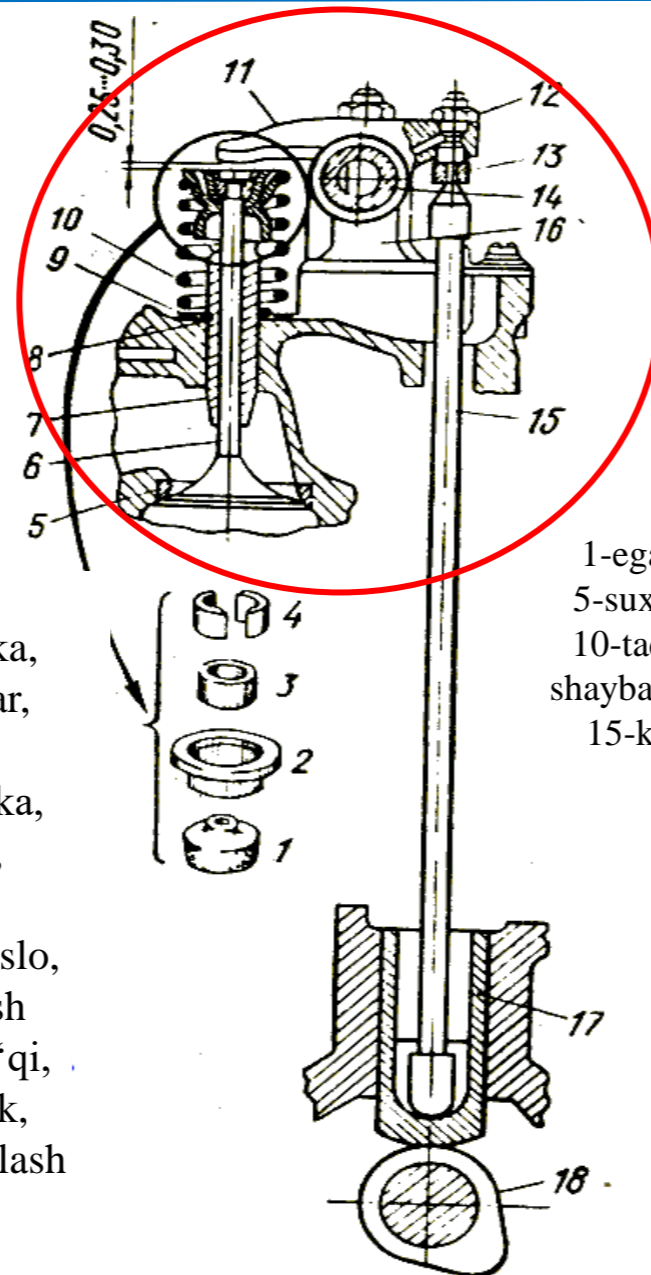
www.otomobilteknoloji.bl



Alttan Eksantrik Mili

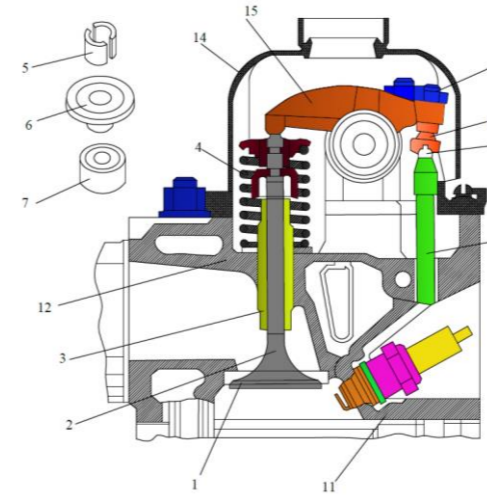
[17]

1-qalpoqcha, 2-tarelka, 3-vtulka, 4-suxariklar, 5-egar, 6-klapan, 7-yoʻnaltiruvchi vtulka, 8-qulfovchi halqa, 9-tayanch shayba, 10-prujina, 11-koromislo, 12-gayka, 13-rostlash bolti, 14-koromislo oʻqi, 15-shtanga, 16-tirgak, 17-turtkich, 18-taqsimlash vali.



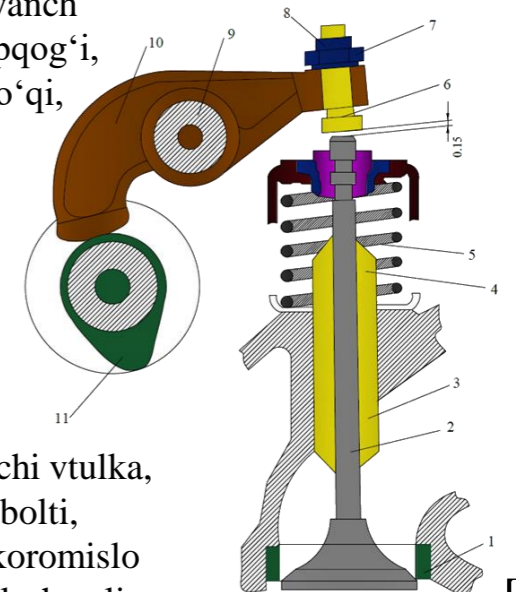
[14]

1-egar, 2-klapan, 3-yoʻnaltiruvchi vtulka, 4-prujina, 5-suxariklar, 6-tarelka, 7-vtulka, 8-gayka, 9-turtkich, 10-taqsimlash vali, 11-oʻt oldirish shami, 12-tayanch shayba, 13-shtanga, 14-silindrlar bosh kallagi qopqogʻi, 15-koromislo, 16-rostlash bolti, 17-koromislo oʻqi, 18-shtanga, 19-silindrlar bloki.



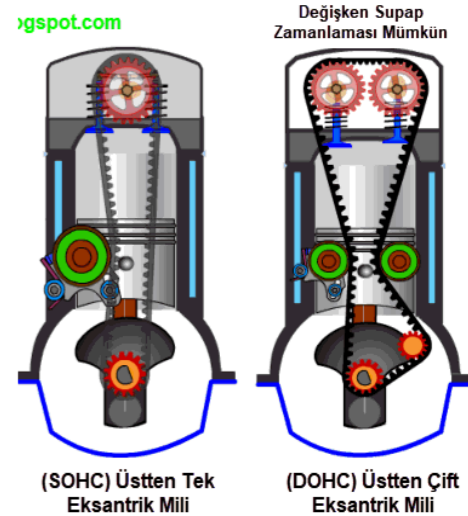
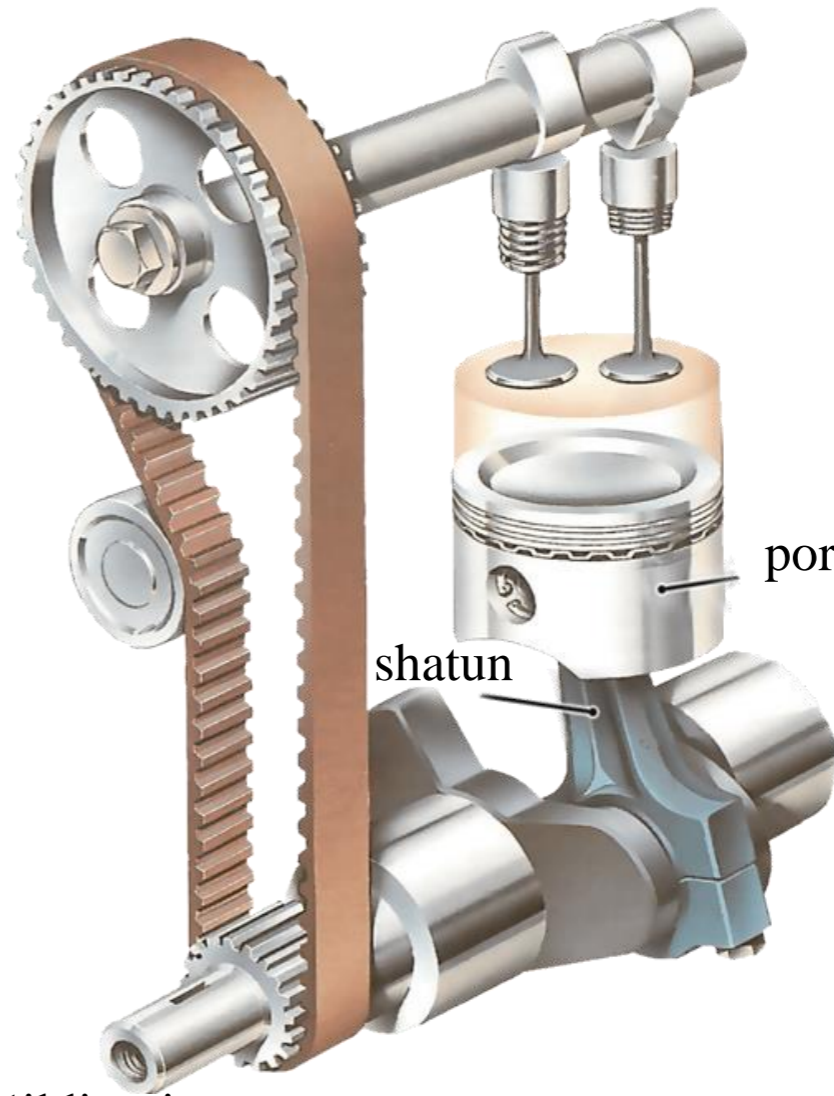
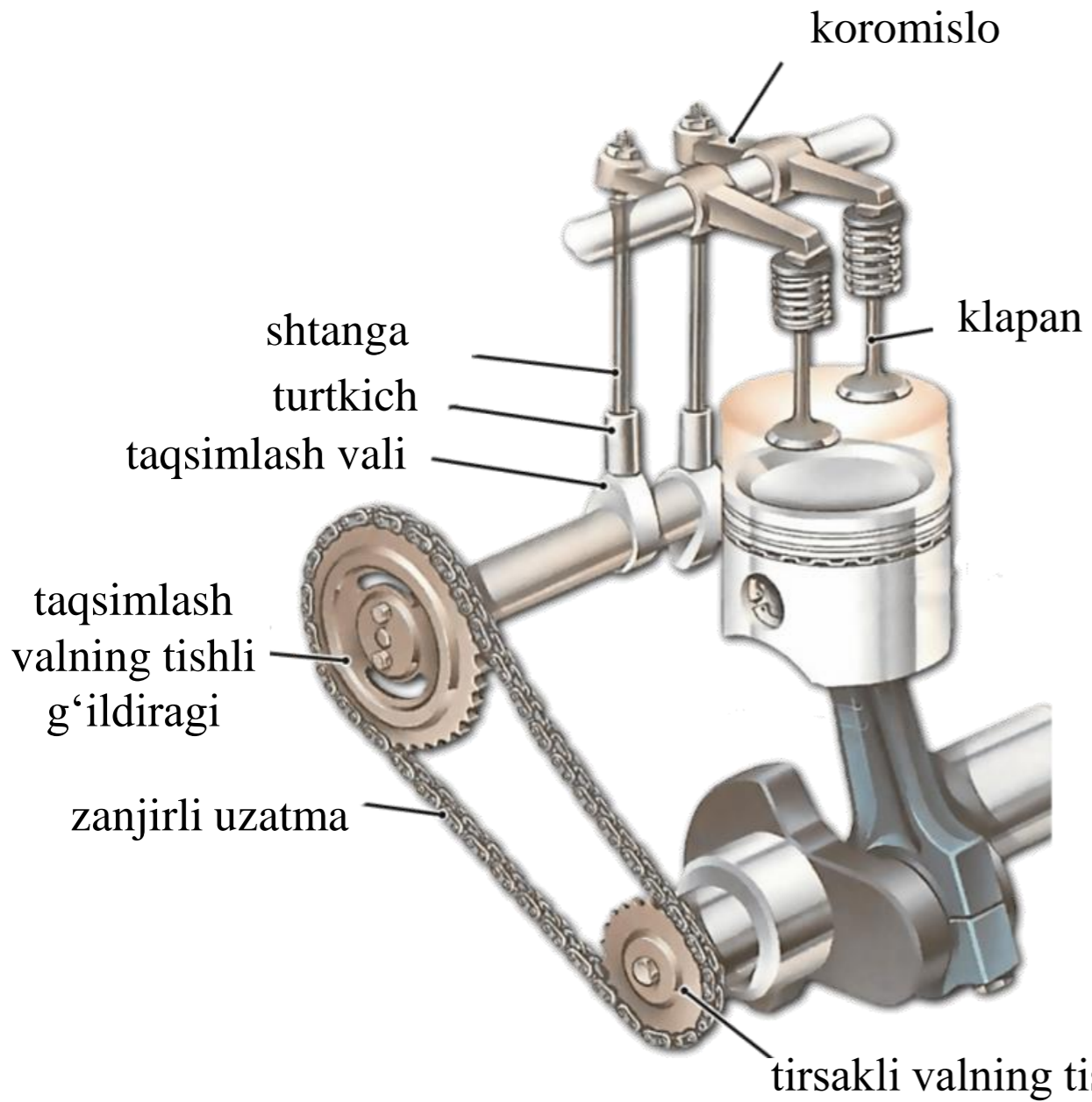
[15]

1-egar, 2-klapan, 3-yoʻnaltiruvchi vtulka, 4-5-prujinalar, 6-rostlash bolti, 7-gayka, 8-qulflash gayka, 9-koromislo oʻqi, 10-koromislo, 11-taqsimlash vali.



[16]

Klapanlari yuqorida joylashgan gaz taqsimlash mexanizmidagi o'zgarish:

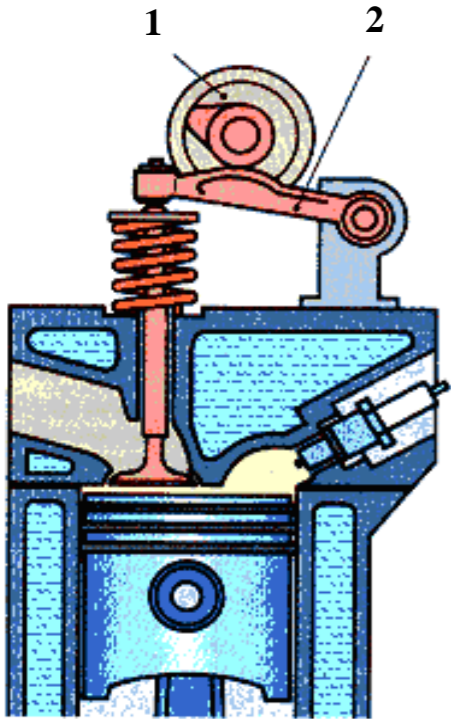


[17]

[18]

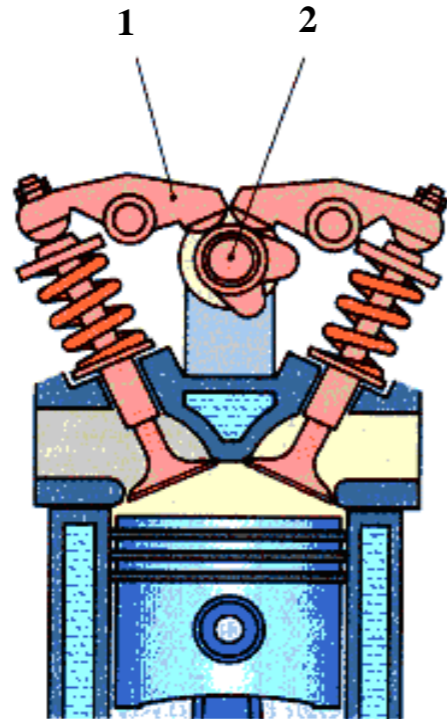
Klapanlari yuqorida joylashgan GTM konstruksiyalarining turlari

OHV



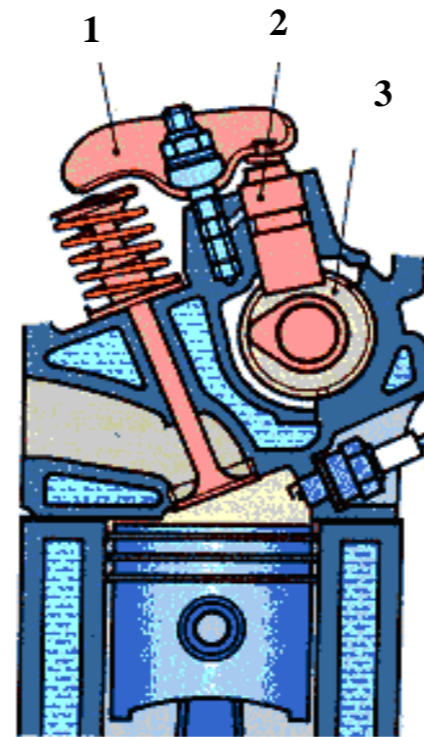
1-gaz taqsimlash vali, 2-koromislo.

OHV/OHC/SOHC



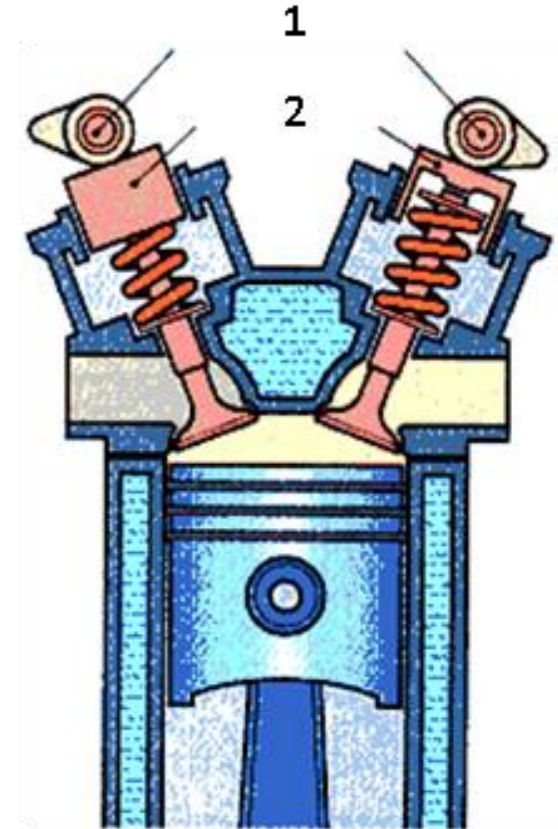
SOHC – Single Over Head Camshaft

OHV/OHC/SOHC



1-koromislo, 2-klapan turtkichi,
3-gaz taqsimlash vali.

OHV/DOHC



1-gaz taqsimlash vali,
2-gidrokompensator.

OHV – Over Head Valve

OHC – Over Head Camshaft

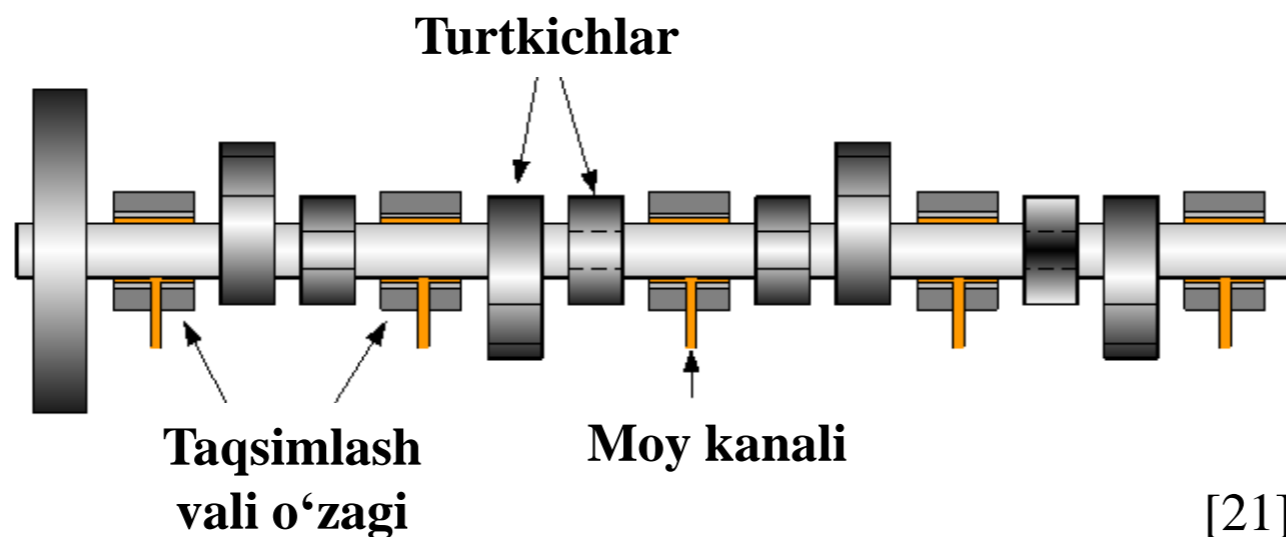
DOHC – Double Over Head Camshaft

[19]

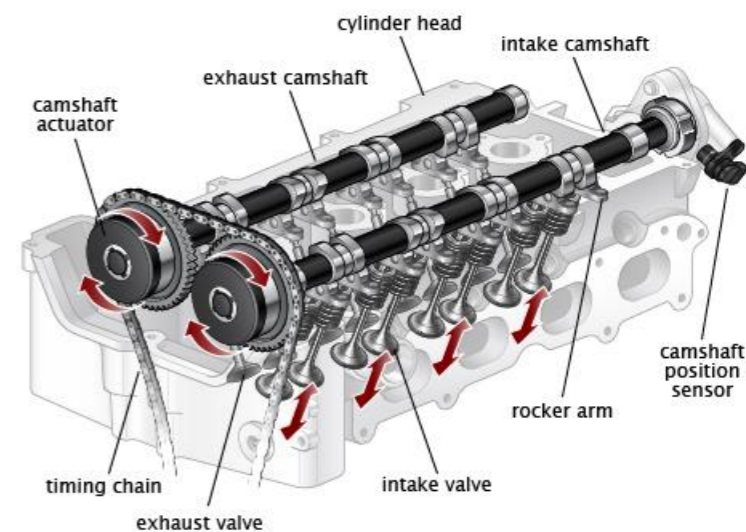
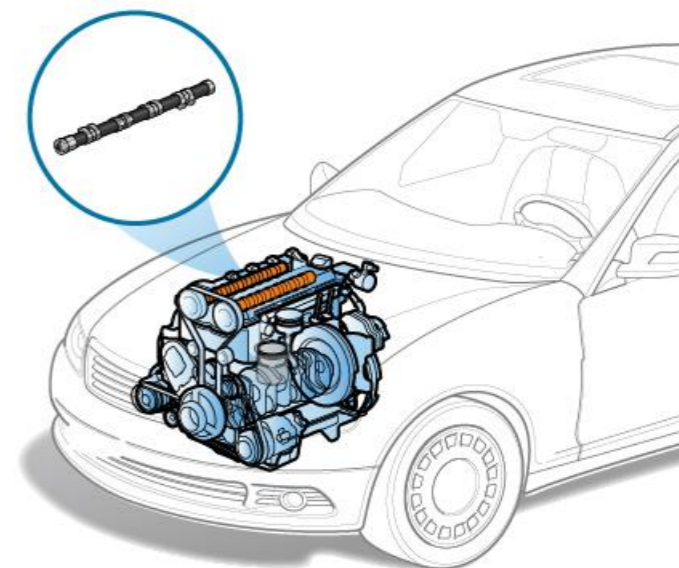
4.3. GTM valining konstruksiyasi va uning yuritma turlari.

Taqsimlash vali harakatni tirsakli valning tishli g'ildirigidan zanjirli yoki tasmali uzatma yordamida harakatni oladi.

2 : 1

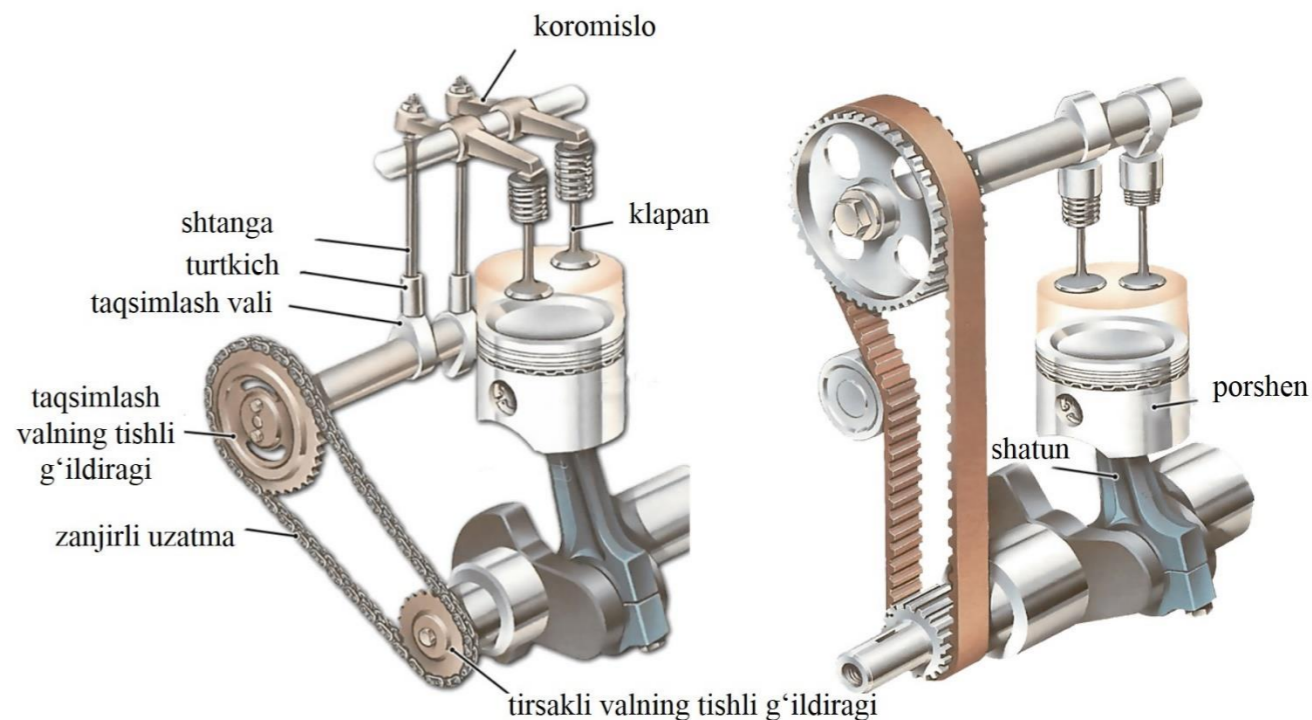


Zamonaviy yengil avtomobil dvigatellarida ko'pincha taqsimlash vali silindrlar blokining kallagida maxsus korpusda joylashadi.



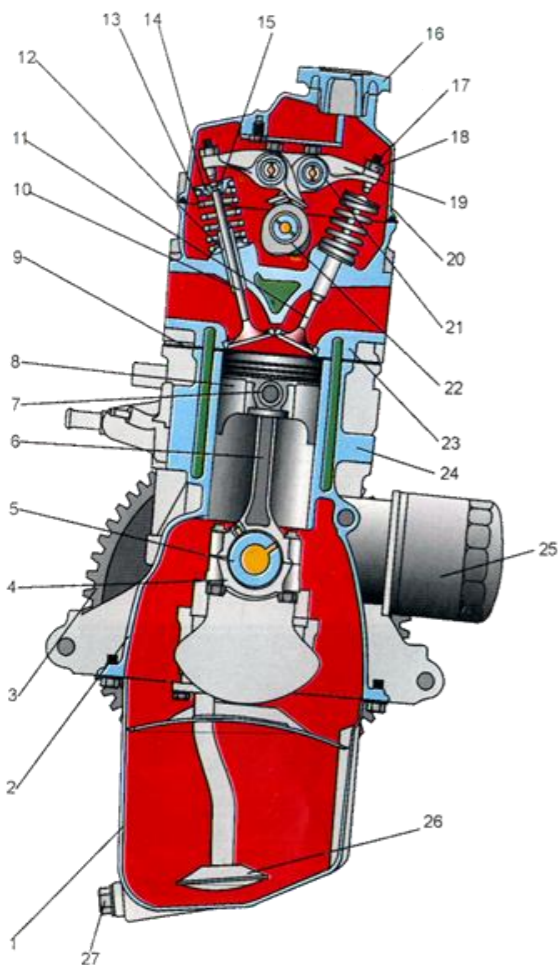
Bu usulda, gaz taqsimlash mexanizmining konstruksiyasi birmuncha soddalashadi.

Bunda klapanlar harakatni to‘g‘ridan-to‘g‘ri taqsimlash vali mushtchalaridan turtkich orqali olib, shtanga, koromislo, koromislo o‘qi, keruvchi prujina, tayanch va boshqa detallar bo‘lmaydi.



[18]

Harakatni tirsakli valning tishli g'ildirigidan zanjirli yoki tasmali uzatma yordamida harakatni oladi.

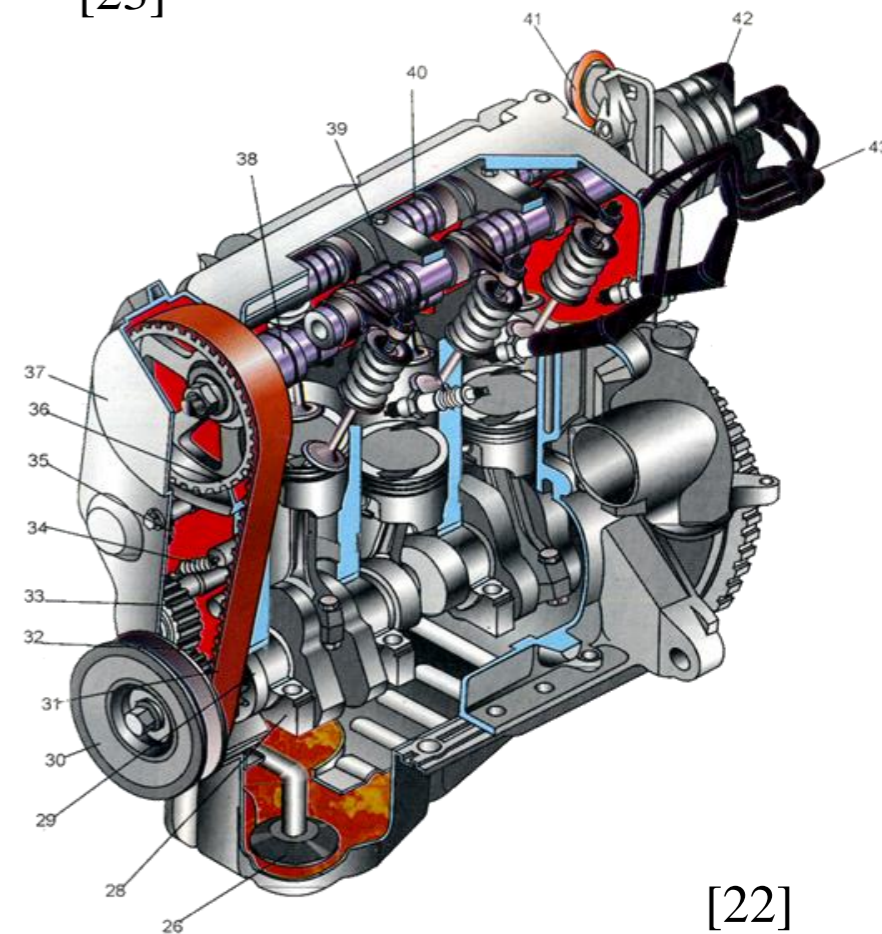


1-silindrlar bloki karteri tagligi, 2-silindrlar bloki karteri, 3-maxovik, 4-shatun qopqog'i, 5-tirsakli val, 6-shatun, 7-porshen barmog'i, 8-porshen, 9-silindrlar bloki kallgining zichlovchi qistirma, 10-kiritish klapani, 11-chiqarish klapani, 12-klapaning yo'naltiruvchi vtulkasi, 13-klapan prujinasi, 14-klapan prujinasining tarelkasi, 15-suxariklar, 16-moy quyish bo'g'zining qopqog'i, 17-rostlash vinti, 18-kontrgayka, 19-koromislo, 20-silindrlar bloki kallagining qopqog'i, 21-koromislolar o'qi, 22-taqsimlash valining kulachogi, 23-silindrlar blokining kallagi, 24-silindrlar bloki, 25-moy filtri, 26-moy nasosining qabul qilgichi, 27-moy to'kish tiqini.



[23]

28-o'zak podshipnigining qopqog'i, 29-moy nasosi, 30-generator yuritmasining shkivi, 31-taqsimlash vali yuritmasining tishli tasmasi, 32-taqsimlash vali yuritmasining yetakchi tishli shkivi, 33-tishli tasmani taranglovchi qurilmaning tishli shkivi, 34-taranglovchi qurilmaning prujinasi, 35-suv nasosi yuritmasining tishli shkivi, 36-taqsimlash vali yuritmasining tishli shkivi, 37-tishli tasmaning qopqog'i, 38-taqsimlash vali, 39-o't oldirish svechasi, 40-koromislolarning keruvchi prujinasi, 41-o't oldirishni ilgarilatishning vakuum rostlagichi, 42-o't oldirish taqsimlagichi, 43-yuqori kuchlanish simlari.



[22]

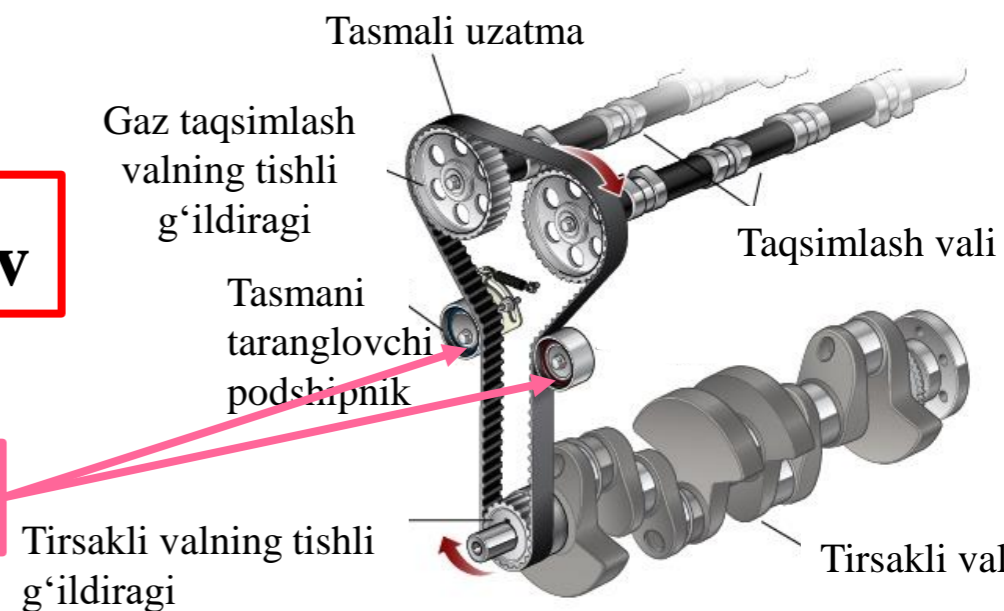
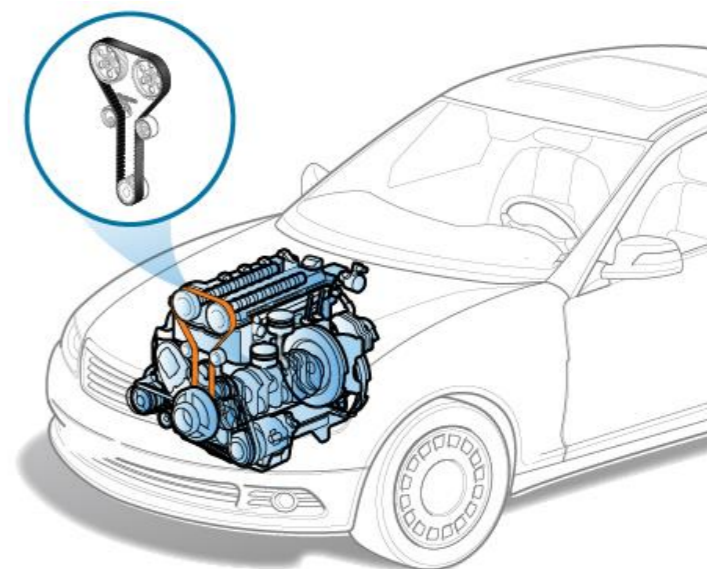
Gaz taqsimlash valining yuritmasi

Taqsimlash vali silindrlar blokining kallagida joylashgan bo'lsa, uning yuritmasi ikki qatorli zanjir yoki sintetik materialdan tayyorlangan tishli tasmadan tashkil topadi.

Yuritma tishli tasma bo'lganda shovqinsiz ishlaydi va moylanmaydi.

Tishli shkiv

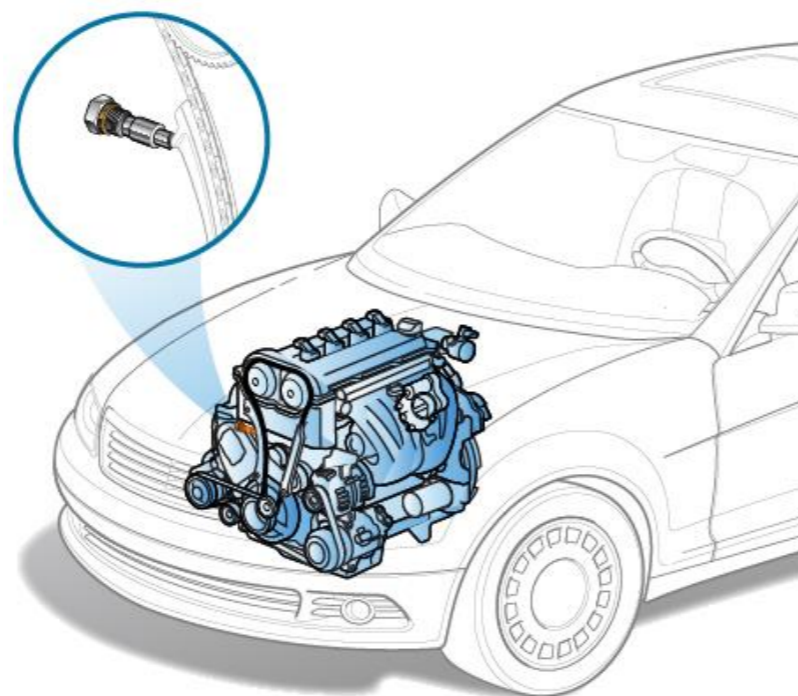
Taranglovchi qurilma



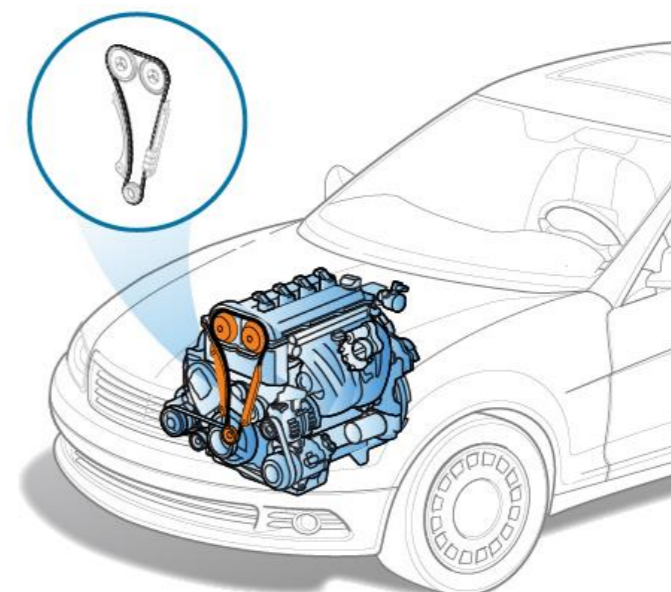
[24]

Yuritma zanjirli bo‘lganda taqsimlash valining oldingi uchiga yetaklanuvchi g‘ildirak mahkamlanadi.

Taranglovchi bolt



[26]



Zanjirli uzatma

Taranglovchi bolt

Zanjirli tasmani taranglovchi elementlar

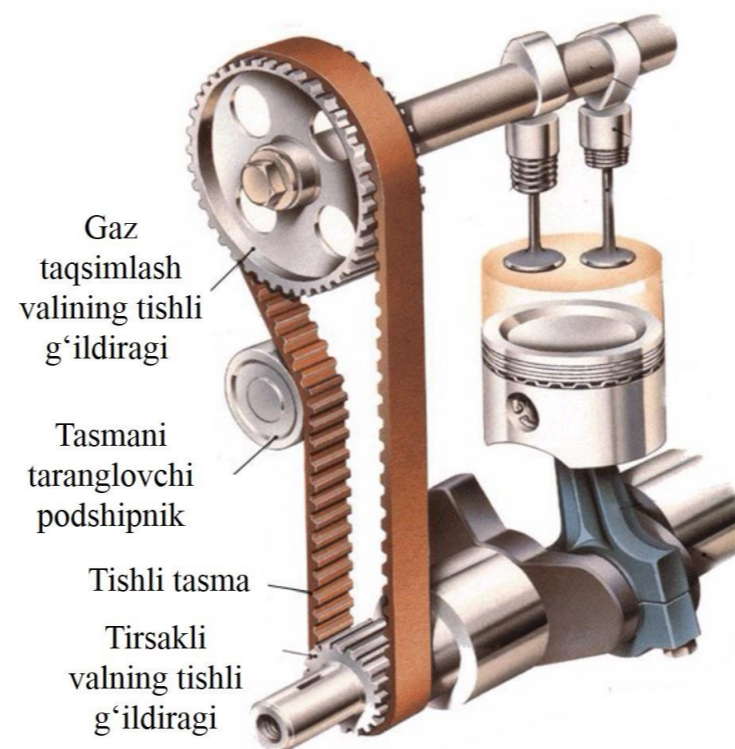
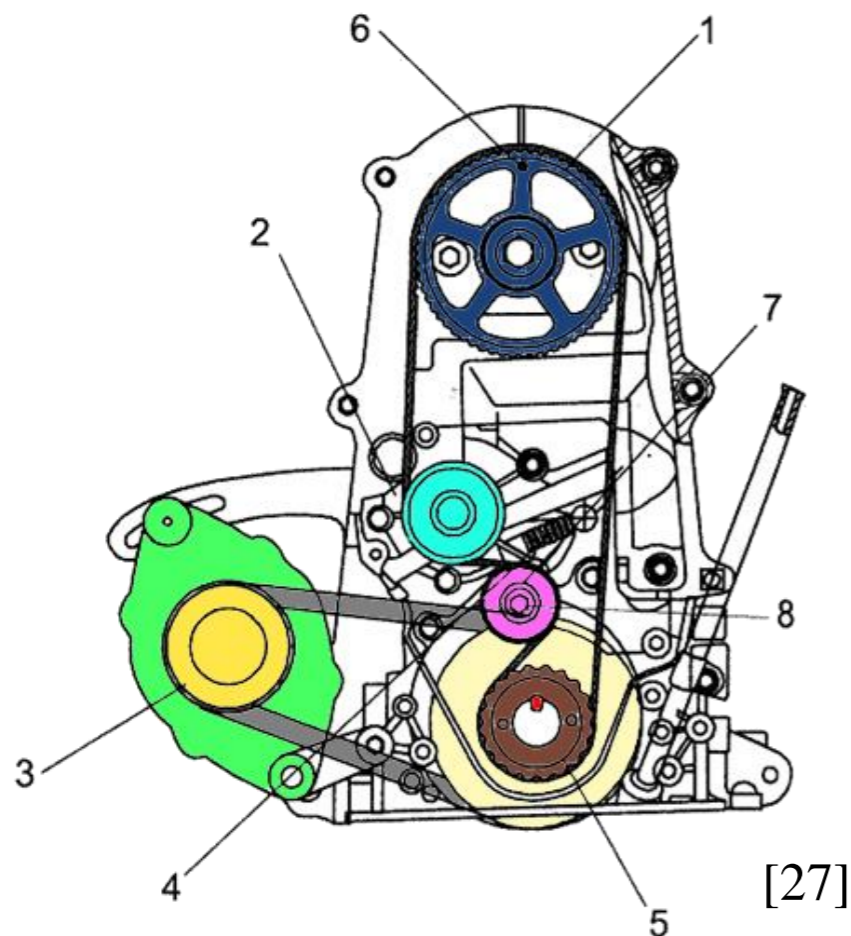
Taqsimlash vali

Zanjirli uzatmani tebranishini so‘ndiruvchi qurilma

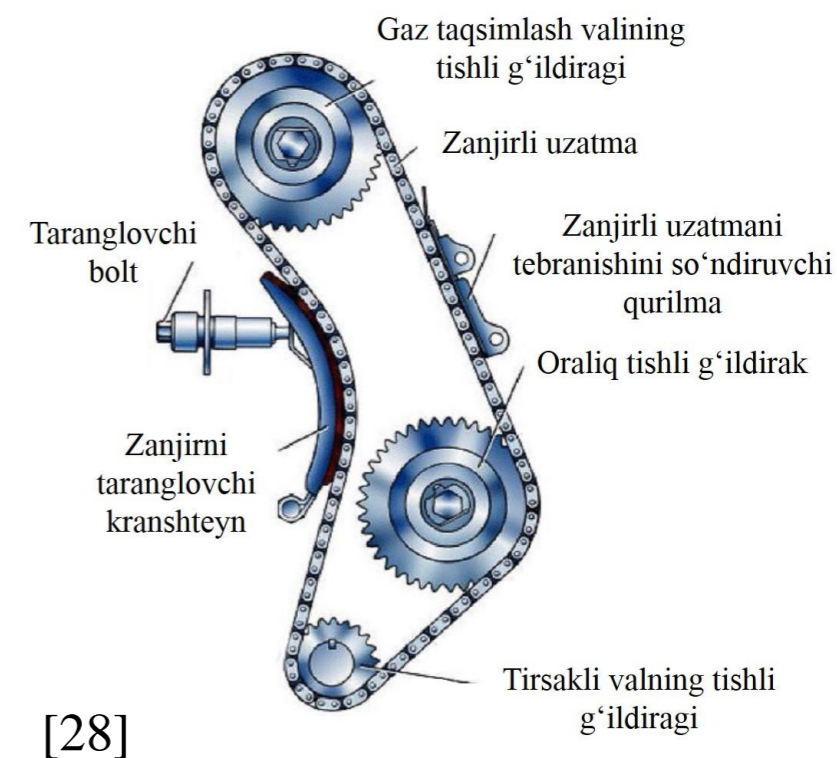
Tirsakli val

Tirsakli valning tishli g‘ildiragi [25]

Tasma uzatmali GTM



Zanjir uzatmali GTM



1-taqsimlash valining tishli shkivi, 2-suv nasosi, 3-generatorning shkivi, 4-taranglovchi qurilma prujinasi, 5-taqsimlash vali yuritmasining yetakchi tishli g'ildiragi, 6-gaz taqsimlash fazalarini o'rnatish belgisi, 7-taranglovchi rolik, 8-taranglovchi rolikning bolti.

GTMning yuritmasi dvigatelning old qismida joylashtiriladi.

Uning korpusi metal yoki plastmassa bo'lishi mumkin.

U GTM yuritma detallarini tashqi chang, suv, loy va boshqa shu kabi iflosliklarda saqlash uchun xizmat qiladi.

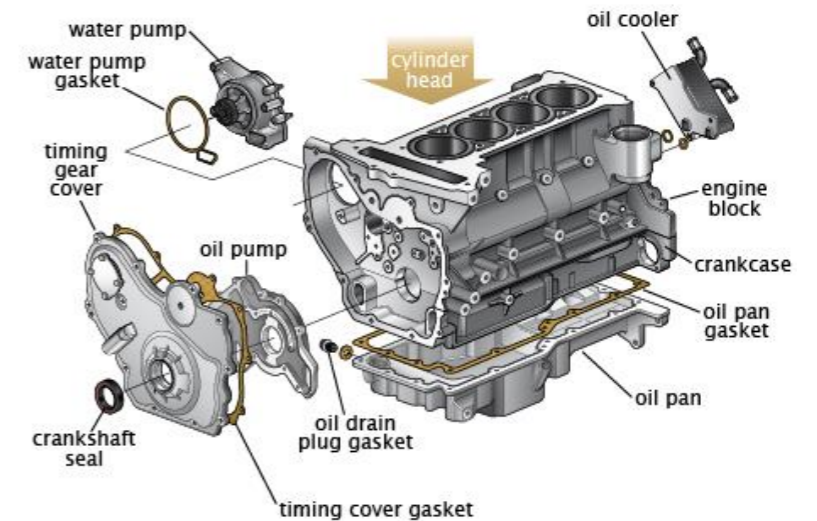
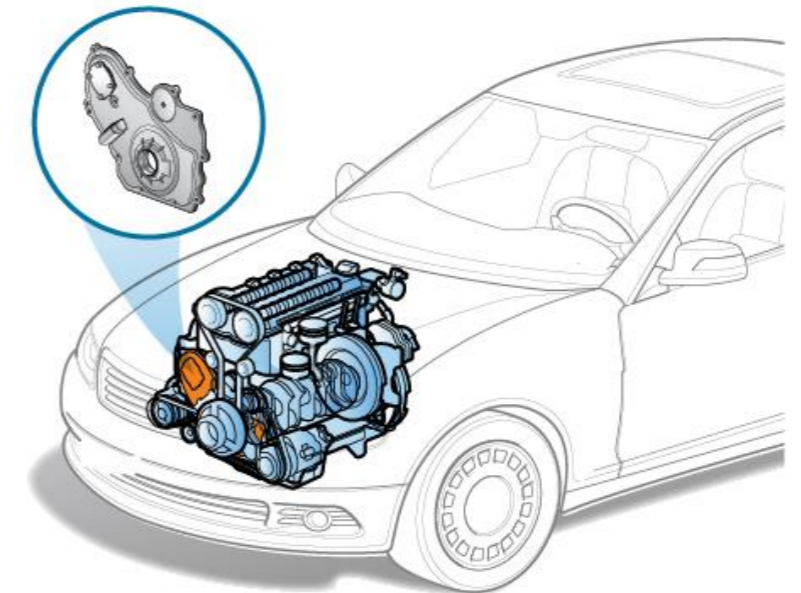


Image courtesy of ClearMechanic.com

[29]



FOYDALANILGAN ADABIYOTLAR

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5. E.Fayzullayev. Transport vositalarining konstruksiyasi. Darslik. I-qism. -T.: “Yangi asr avlodi”, -2006 yil, 59 bet.
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7. Engine | Take me beyond the Horizon. [Online gif] [Accessed on 26 March 2009]. <https://takemebeyondthehorizon.files.wordpress.com/2009/03/engine.gif>
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9. Overhead camshaft (OHC) design with rocker arms. [Online image] [Accessed on 19 June 2023]. https://www.substech.com/dokuwiki/lib/exe/fetch.php?w=&h=&cache=cache&media=overhead_camshaft_ohc_design_with_rocker_arm.png
10. Overhead camshaft (OHC) design with direct cam operation. [Online image] [Accessed on 19 June 2023]. https://www.substech.com/dokuwiki/lib/exe/fetch.php?w=&h=&cache=cache&media=overhead_camshaft_ohc_design_with_direct_cam_operation.png
11. BOSCH Avtomobilsozlik bo'yicha spravochnik (nemis tilida). Fluent Deutschland GmbH 2007 y, 648 b.
12. Основные конструктивные схемы механизмов газораспределения. [Online image] [Accessed on 6 November 2018]. https://studfile.net/html/2706/176/html_yKOT5wPzJy.fMNk/img-mPxdUI.png
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