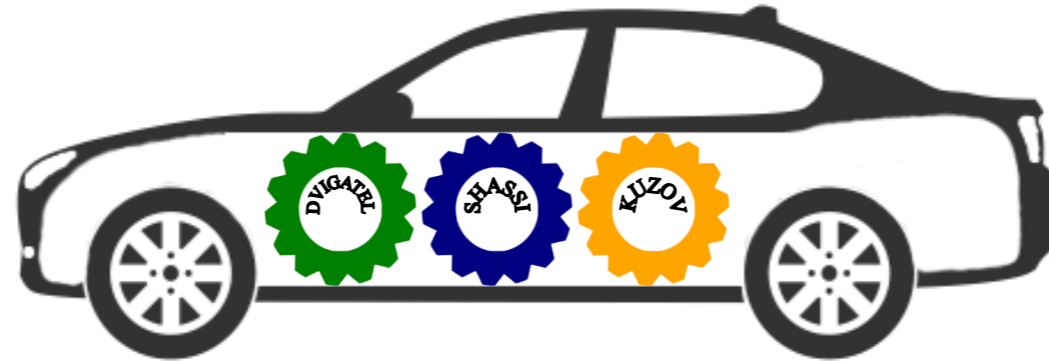


VEHICLES CONSTRUCTION

AVTOMOBILLAR KONSTRUKSIYASI



7th Topic: Fuel System.

(7-Mavzu: Ta'minlash tizimi)

Part 1

Associate Professor: Yusupov Sarvarbek

7-Mavzu: Ta'minlash tizimi

(7th Topic: Fuel System.)

O'quv rejası:

7.1. Karbyuratorli dvigatellarning ta'minlash tizimi.

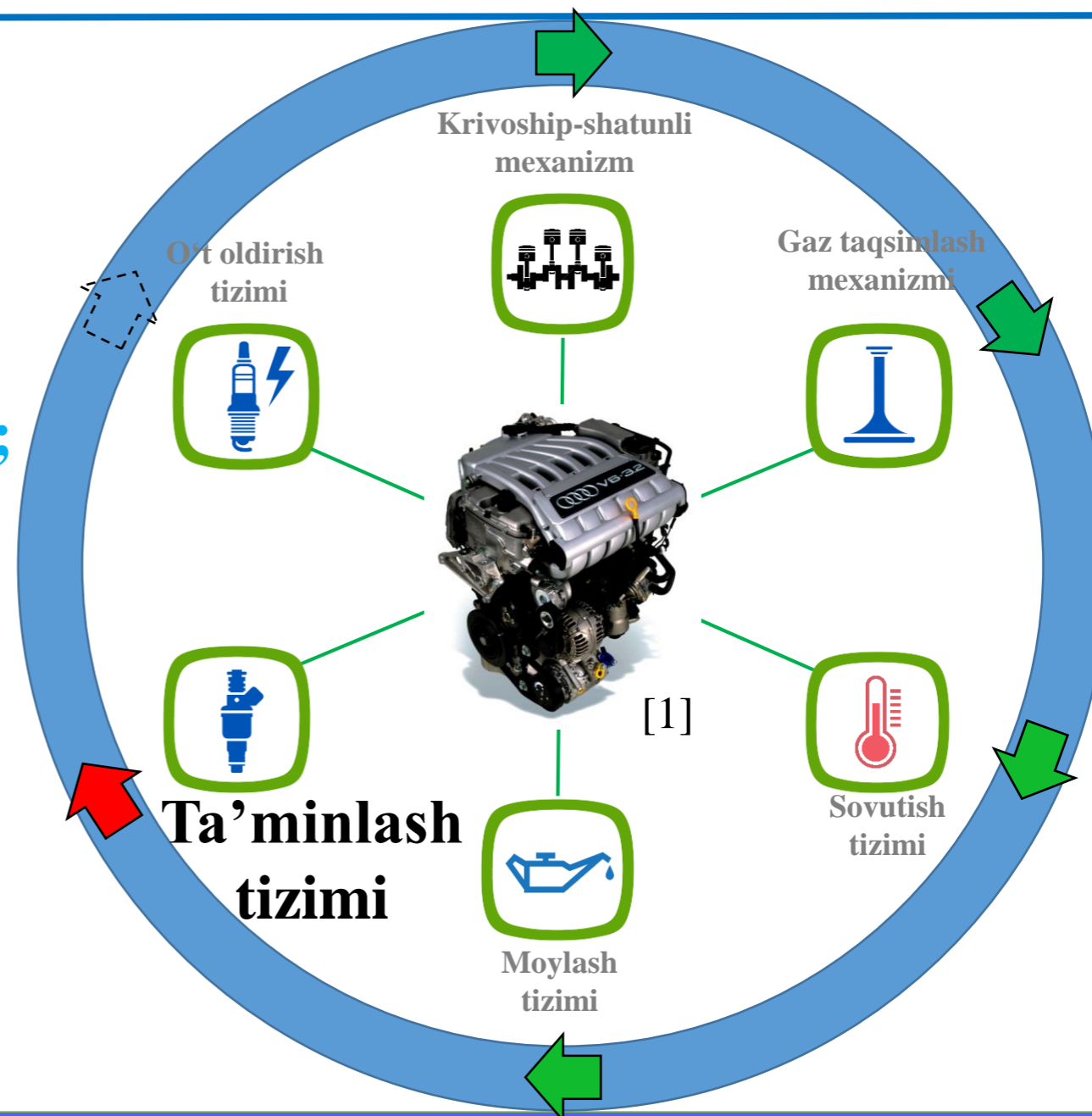
7.2. Ta'minlash tizimi qismlarining konstruksiyasi va ishlashi.

7.3. Dizel dvigatelining ta'minlash tizimi.

7.4. Dizel dvigateli ta'minlash tizimi qismlarining konstruksiyasi va ishlashi.

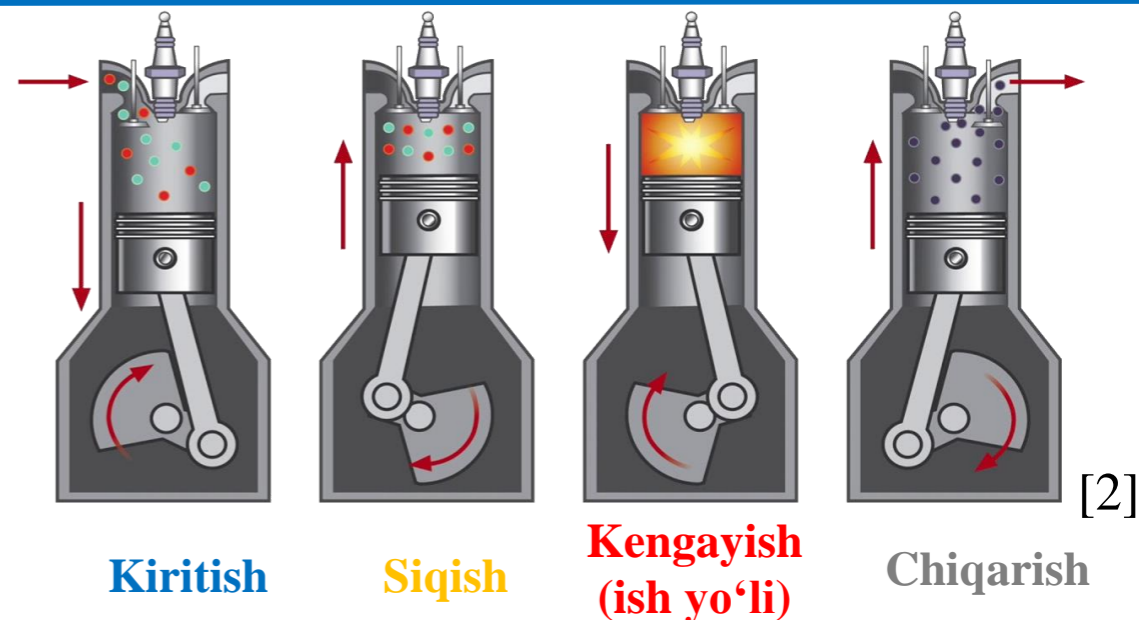
➤ **Karbyuratorli dvigatel;**

- Dizel dvigatel;
- Gazli dvigatel;
- Injektorli dvigatel.



7.1. Karbyuratorli dvigatellarning ta'minlash tizimi.

Ichki yonuv dvigatelining ishlashi uchun uni **havo** va **yonilg'idan** iborat **yonuvchi aralashma** bilan ta'minlash lozim.

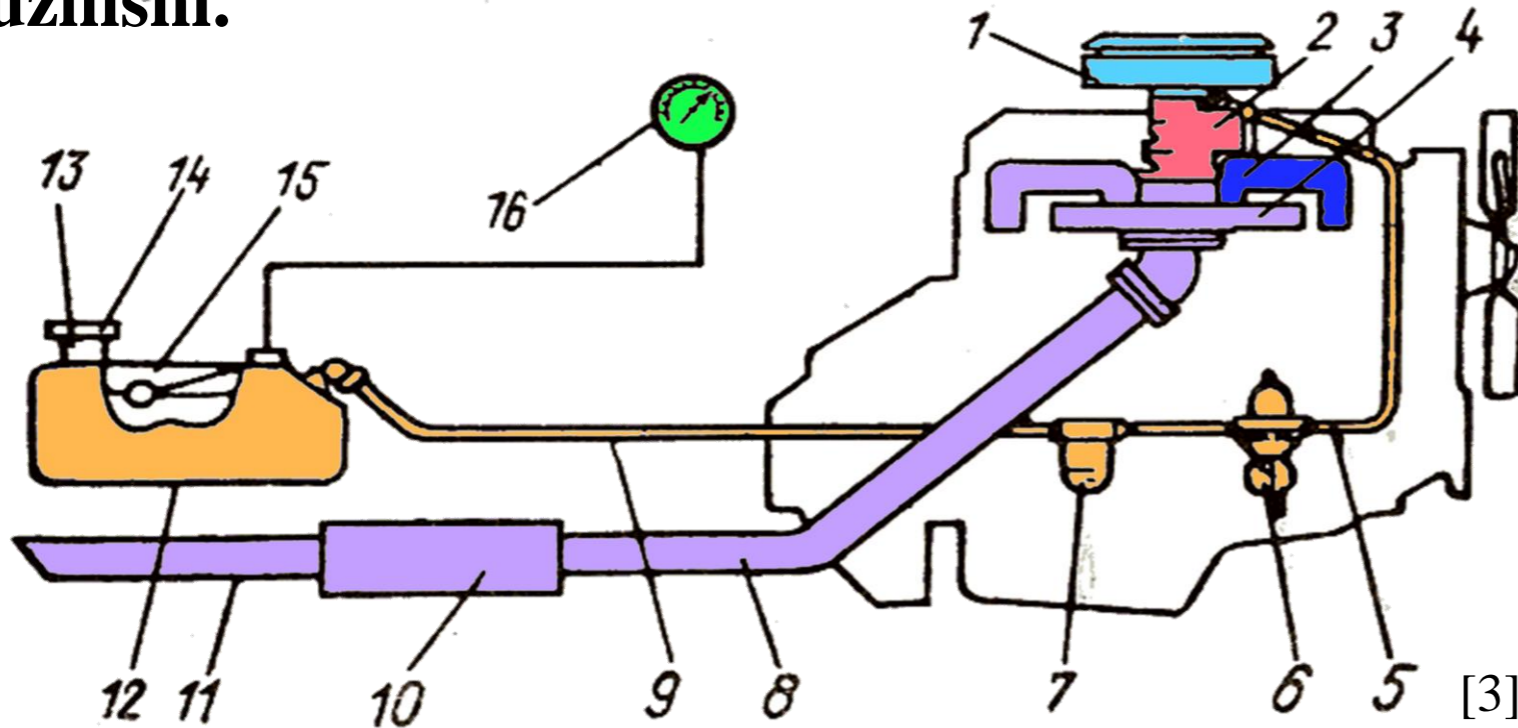


Vazifasi.

Ta'minlash tizimi dvigatelning ish rejimiga mos ravishda ma'lum tarkibdagi yonuvchi aralashma tayyorlash va uni kerakli miqdorda silindrlarga uzatish hamda ishlatilgan gazlarni chiqarib yuborish uchun xizmat qiladi.

Karbyuratorli dvigatelning ta'minlash tizimi sxemasi.

Tuzilishi.



1-havo filtri; 2-karbyurator; 3-kiritish quvuri; 4-chiqarish quvuri; 5-naycha; 6-yonilg'i nasosi; 7-filtr-tindirgich; 8-so'ndirgichning qabul qiluvchi trubasi; 9-naycha; 10-shovqin so'ndirgichi; 11-chiqarish quvuri; 12-yonilg'i baki; 13-yonilg'i quyish bo'g'zi; 14-qopqoq; 15-qalqovichli qurilma; 16-yonilg'i zahirasini ko'rsatuvchi asbob.

Ta'minlash tizimini tashkil etuvchi ba'zi bir asboblarning konstruksiyalaridagi farqlarga qaramasdan, **har xil** rusumdagi avtomobillar ta'minlash tizimining **umumiy tuzilishi** va **ishlashi** qariyb **bir xildir**.

Ta'minlash tarmog'iga kiruvchi asbob-uskunalarni to'rt guruhga bo'lish mumkin:

1) Yonilg'ini saqlash, tozalash va uni yonuvchi aralashmani hosil qiluvchi asbobga yuborish qismlari.

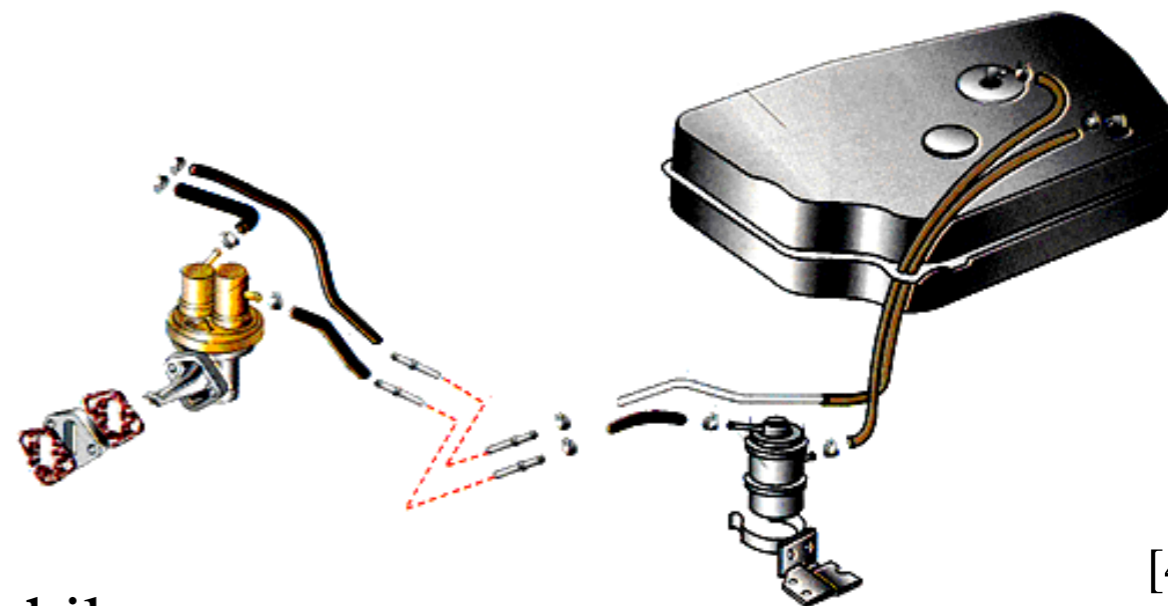
Yonilg'i baki,

yonilg'i sathini ko'rsatuvchi datchik,

yonilg'i filtri,

yonilg'i nasosi,

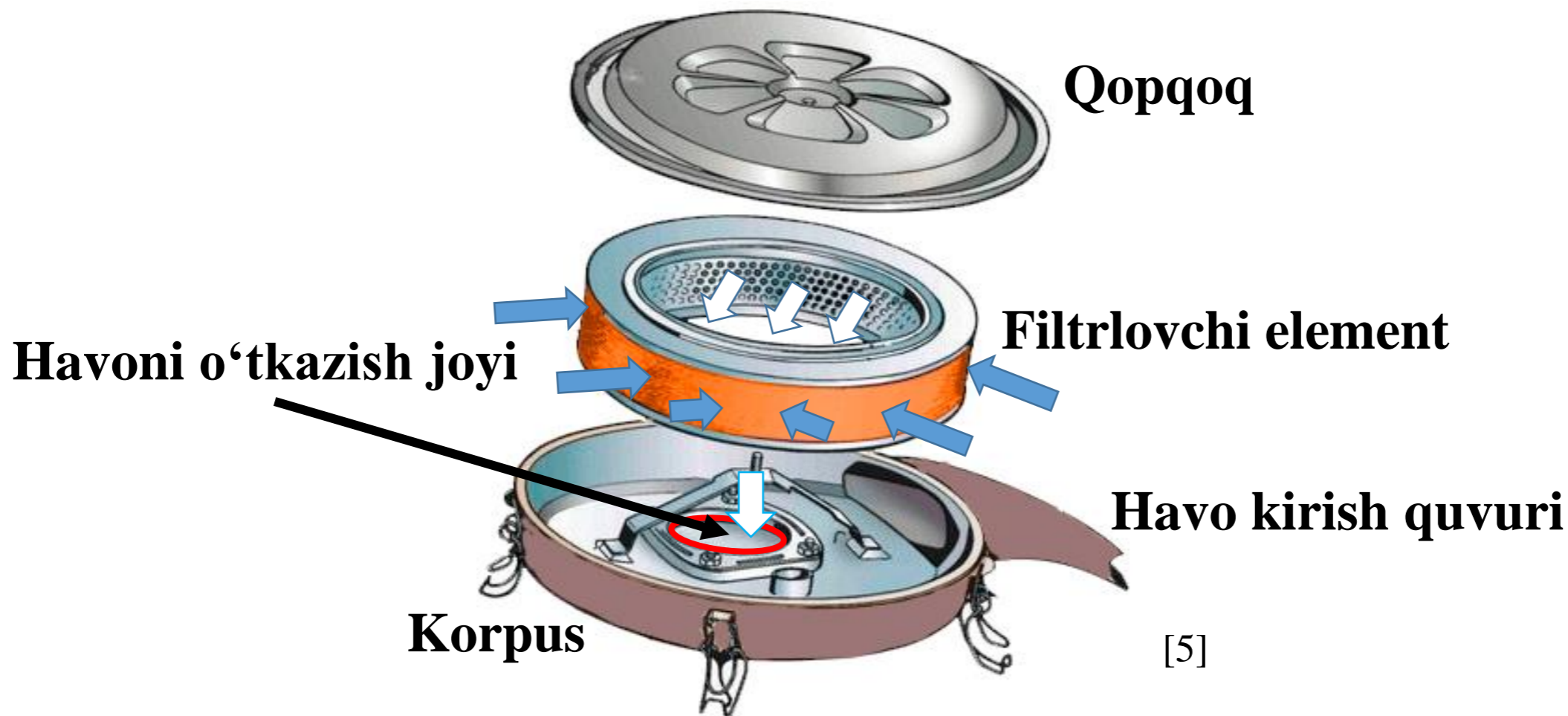
yonilg'ini o'tkazuvchi naychalar.



[4]

2) Havoni tozalash va uni uzatish qurilmasi - havo filtri va havo

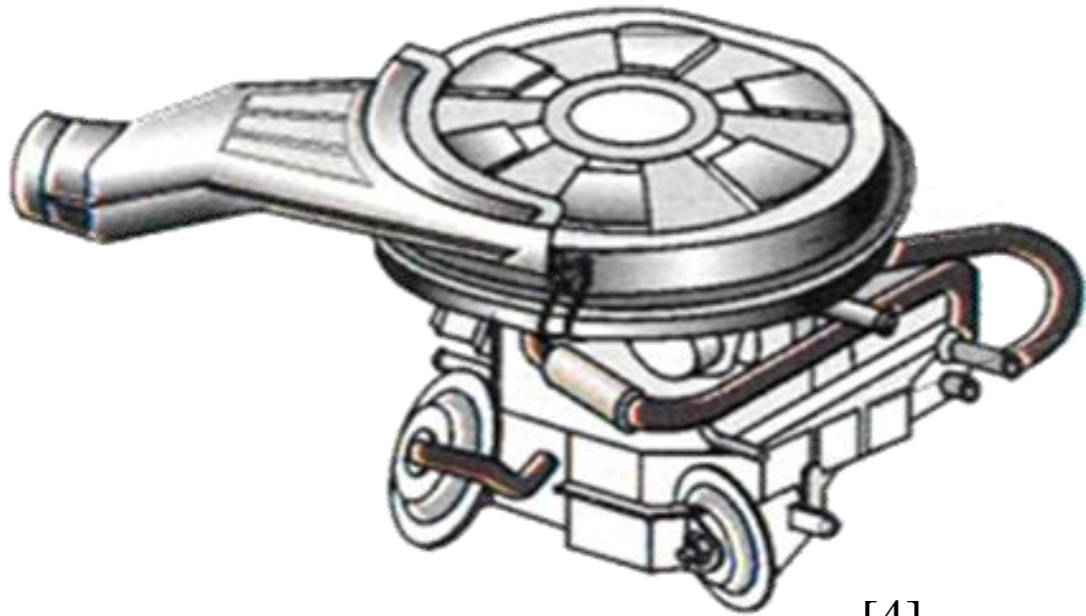
o'tkazgichi;





KIUT

3) Yonilg‘i va havodan aralashma hosil qiluvchi asbob — karbyurator;



[4]

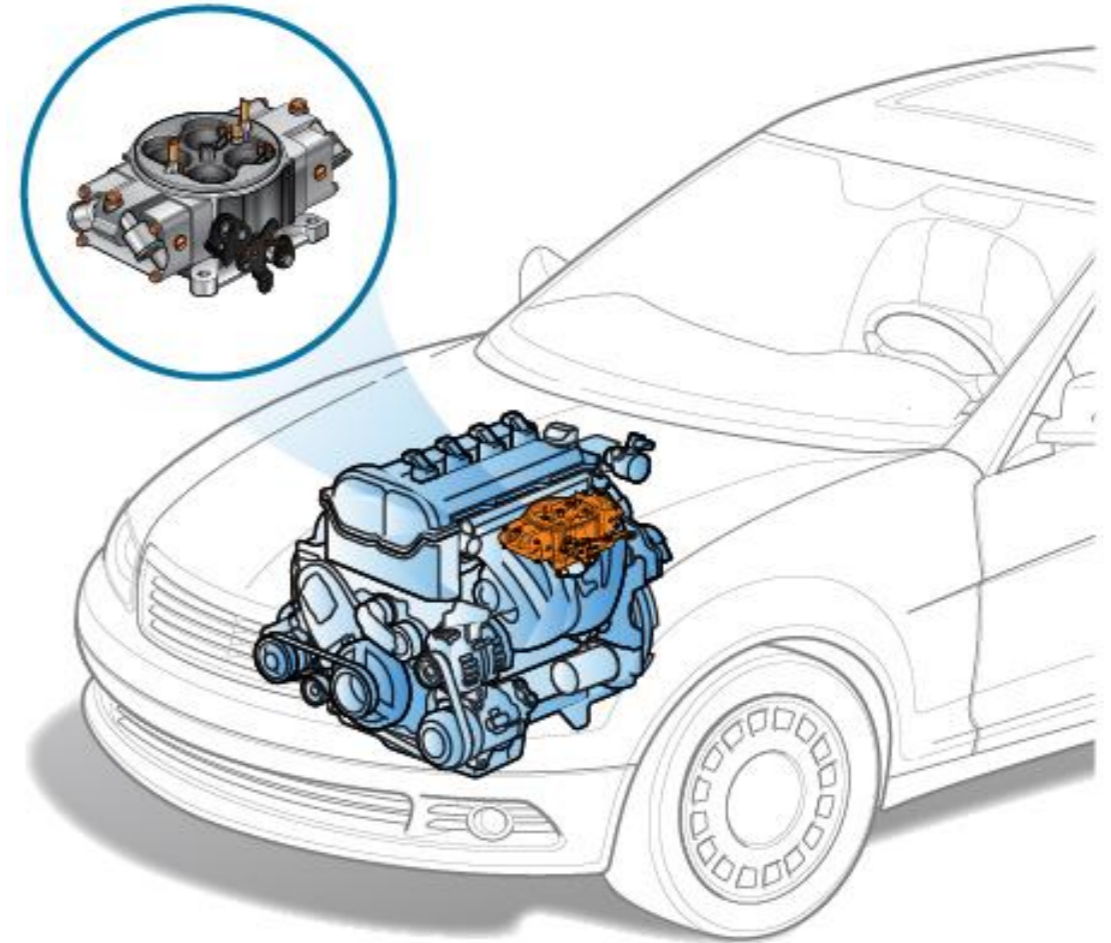


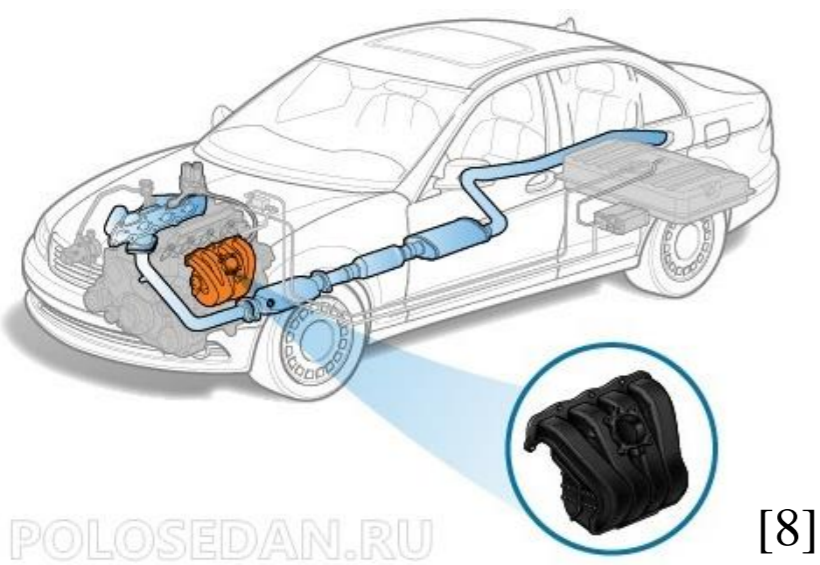
Image courtesy of ClearMechanic.com

[6]

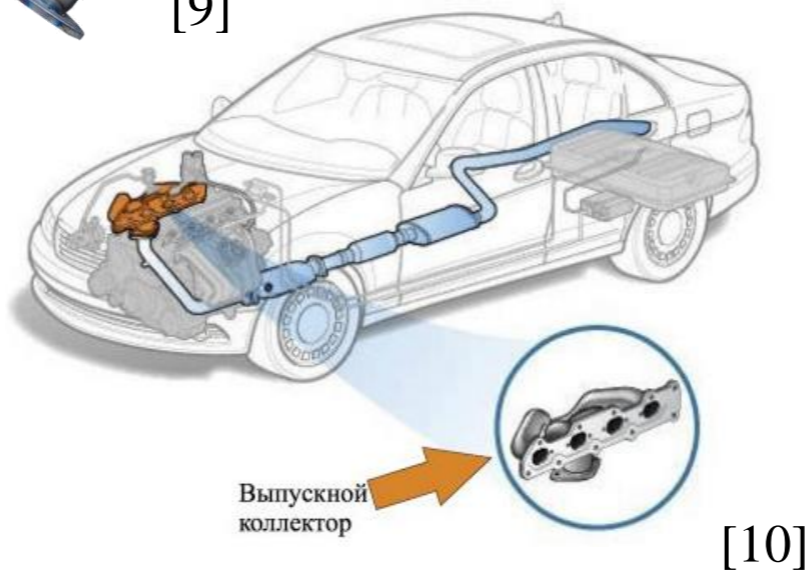
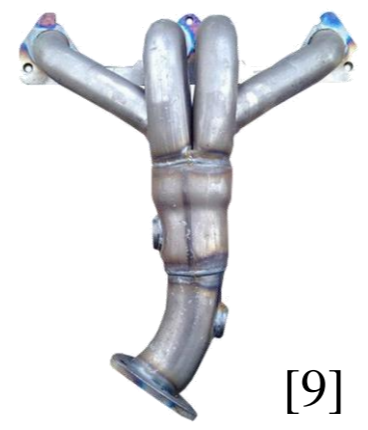
4) Yonilg'i aralashmasini silindrlarga kirituvchi va ishlatilgan

gazlarni chiqarib, ularning tovushini pasaytiruvchi qismlar.

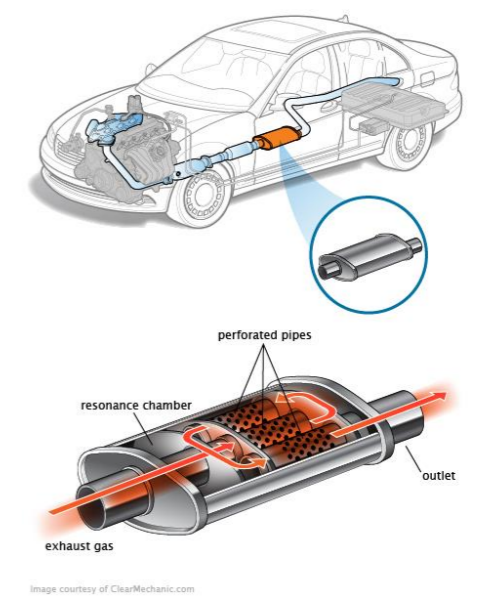
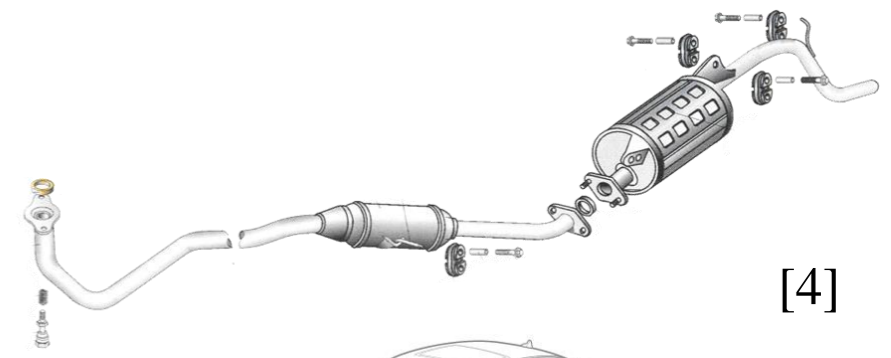
Kiritish quvuri



Chiqarish quvuri

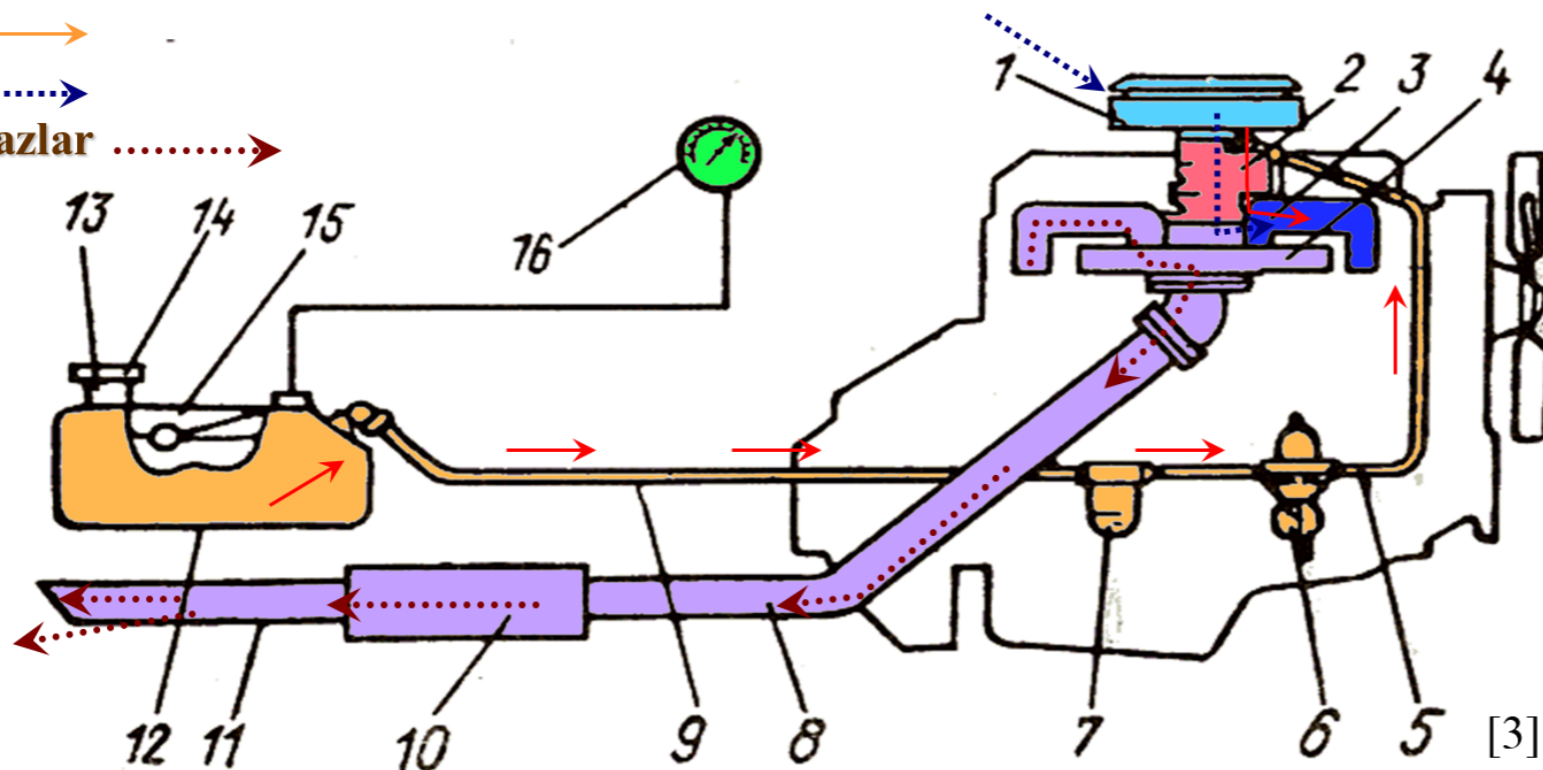


So'ndirgich (glushitel)

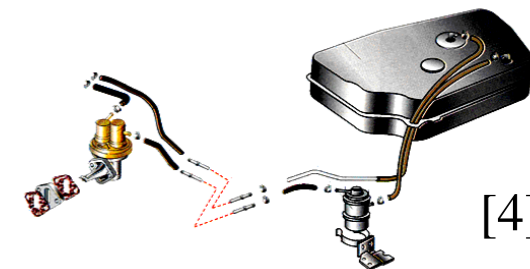


Qisqacha xulosa:

yonilg'i →
 havo→
 ishlatilgan gazlar→



1



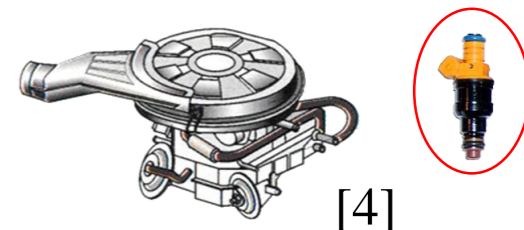
[4]

2



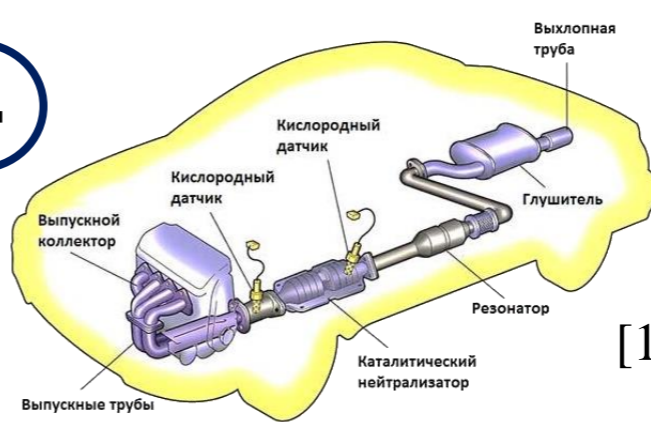
[5]

3



[4]

4



[12]

Dvigatel silindrlaridan tashqarida suyuq yonilg‘i va havodan yonuvchi aralashma tayyorlash jarayonini **karbyuratsiyalash**

va bu jarayonni sodir etuvchi asbobni esa **karbyurator** deyiladi.

Dvigatelning quvvati va yonilg‘i tejamkorligi ko‘rsatkichlari karbyuratorning texnikaviy holati hamda ishlashi bilan bevosita bog‘liqdir.

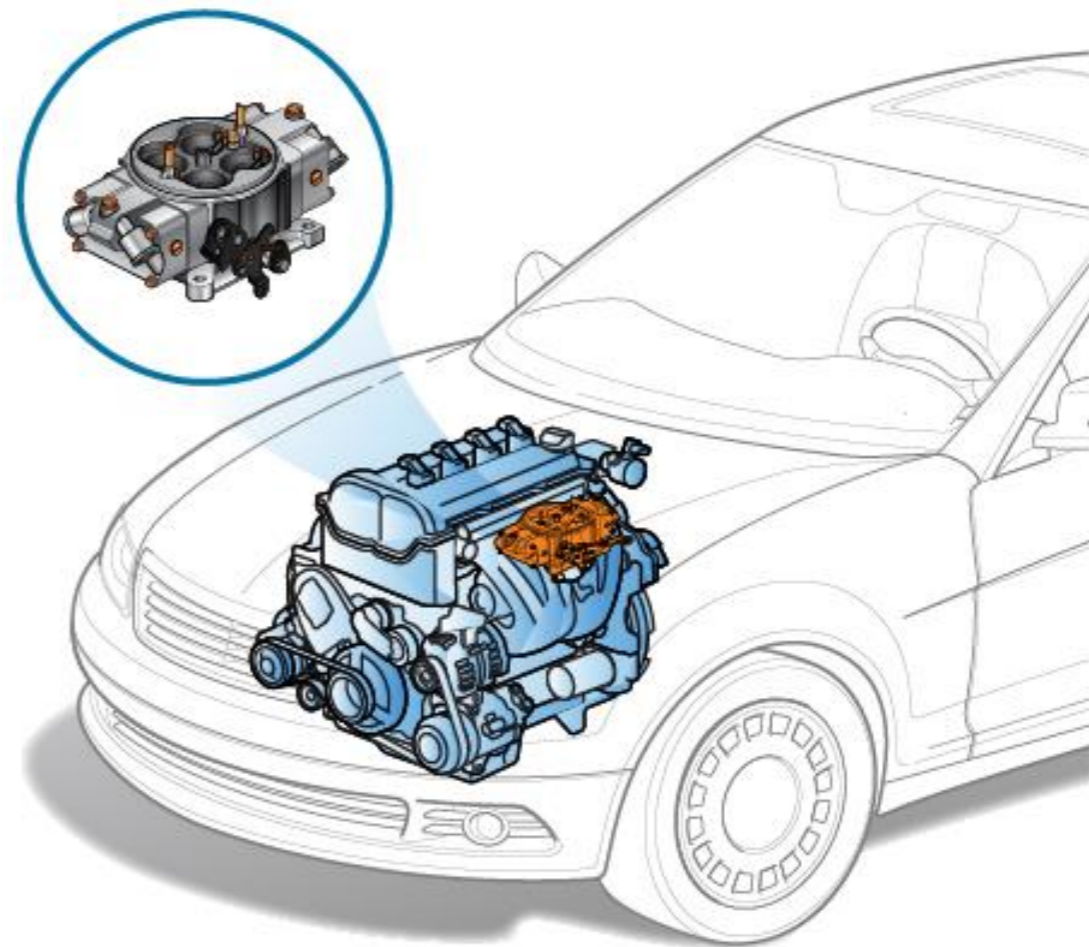


Image courtesy of ClearMechanic.com

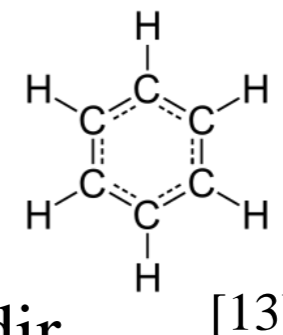
[6]

Yonuvchi aralashma va uni tayyorlash.

Karbyuratorli dvigatellarda → benzin qo‘llaniladi.

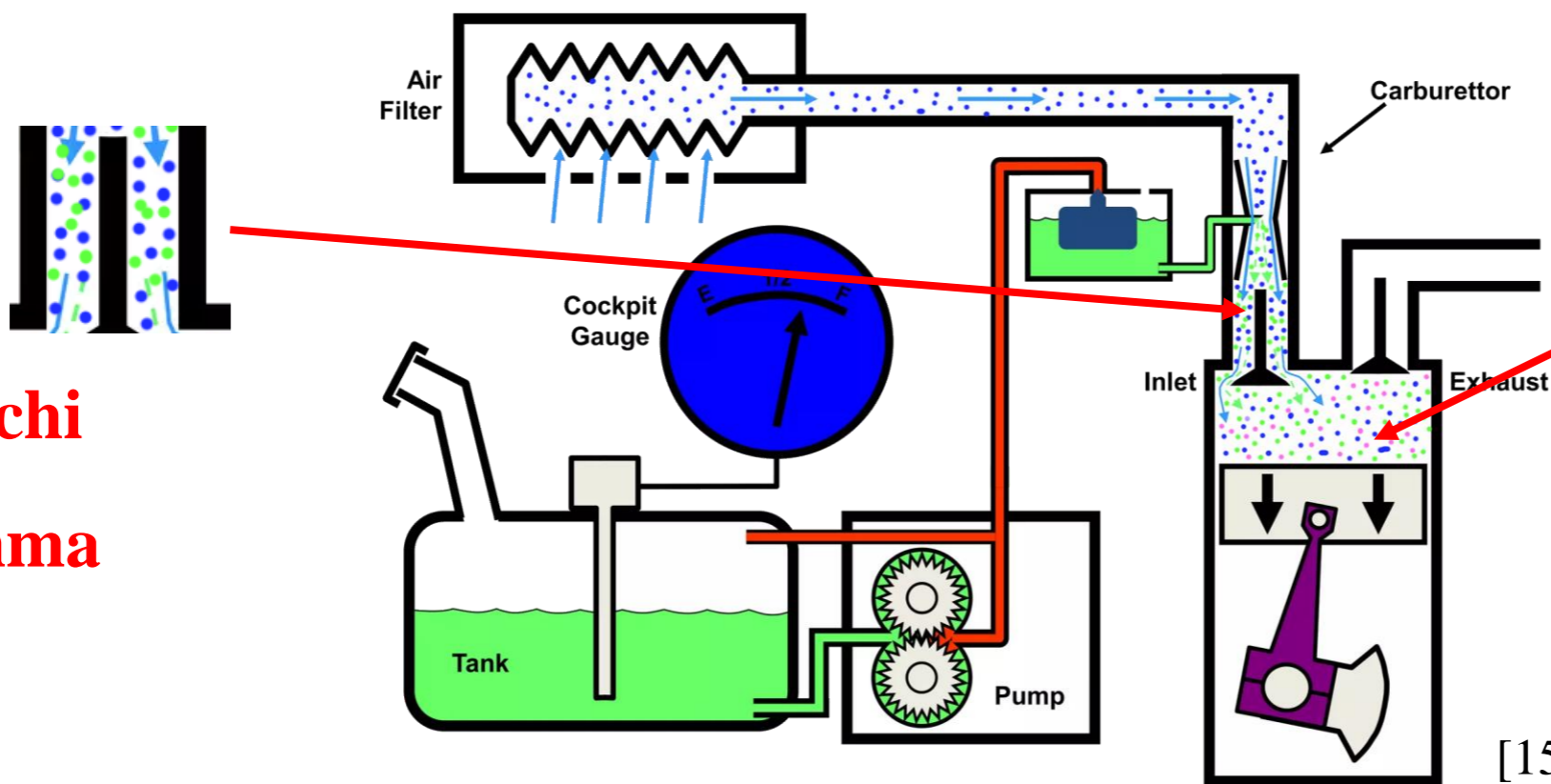
Benzin neftni qayta ishlash mahsuloti bo‘lib,

(C–uglerod) + (H–vodorod) = Murakkab kimyoviy birikmadir.



[14]

Yonuvchi aralashma



[15]

Ish aralashmasini



Ish aralashmasi quyidagi talablarga javob berishi lozim:

- 1. Aralashma tarkibi dvigatelning har bir ish rejimiga mos ravishda bo‘lishi kerak;**
- 2. Benzin aralashmada bug‘simon holatda bo‘lishi kerak;**
- 3. Har bir silindr ichida, shuningdek hamma silindrlarda aralashma bir tarkibli bo‘lishi kerak.**

1 kg yonilg‘i to‘la yonib bo‘lganda hosil bo‘ladigan issiqlik miqdori *issiqlik berish* qobiliyati deb ataladi.



[14]

1 kg benzin

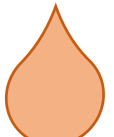
44000...46000 kJ
(10500 kkal)
issiqlik energiyasi

Yonuvchi aralashmaning tarkibi **havo ortiqlik koeffitsiyenti** (α) bilan baholanadi.

$$\alpha = \frac{L}{L_{n.m}}$$

L - yonish jarayonida ishtirok etayotgan haqiqiy havo miqdori;

$L_{n.m}$ - yonilg‘ini to‘la yonishi uchun zarur bo‘ladigan **nazariy havo** miqdori.

 1 kg **benzin** to'la  nazariy jihatdan $P_{me'yoriy}$ da va 20° da **15 kg** ($12,5 m^3$) O_2 .


Bunday nazariy to'g'ri tarkibdagi aralashma ($\alpha \approx 1,0$) me'yoriy deyiladi.



Amalda nazariy aralashmada benzin to'la **yonmaydi**.

 1 kg **benzin** to'la  uchun \rightarrow **17-18 kg** O_2 .

! Aralashmadagi  O_2 **benzin** to'la   bo'ladi,
 tezligi  .

Bu esa, o'z navbatida N_{dv}  olib keladi.

  tezligini  uchun aralashmadagi O_2  lozim.

Eng   tezligi **1 kg benzina**ga $\approx 13 \text{ kg } O_2$ to'g'ri kelganda sodir bo'ladi.

Bu nisbatdagi aralashma N_{dv}  olishni ta'minlaydi.

! benzinning  to'la bo'lmaganligi sababli,

Yonilg'i tejamkorligi yomonlashadi.

∴, yonuvchi aralashmadagi $L, L_{n.m}$ ga nisbatan:

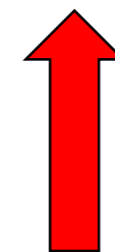
- Ko'payib ketsa ($\alpha > 1,0$), **kambag'al** aralashma;
- Kamayib ketsa ($\alpha < 1,0$), **boy** aralashma deyiladi.

Yonuvchi aralashma tayyorlash quyidagi jarayonlardan tashkil topadi:

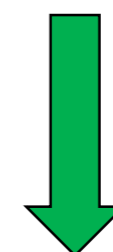
1. Havoning karbyurator orqali harakatlanishi;

2. Benzinning jiklyordan oqib chiqishi;

3. Benzinning purkalishi va bug‘lanishi.

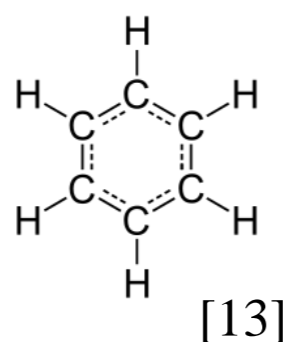
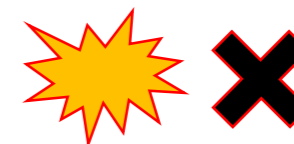


boy



kambag‘al

aralashma



max
 $\int O_2$
min

aralashmaning
alanganish chegarasi

deyiladi.

Boy aralashmani alanganish chegarasi ($\alpha \approx 0,4$) \uparrow .

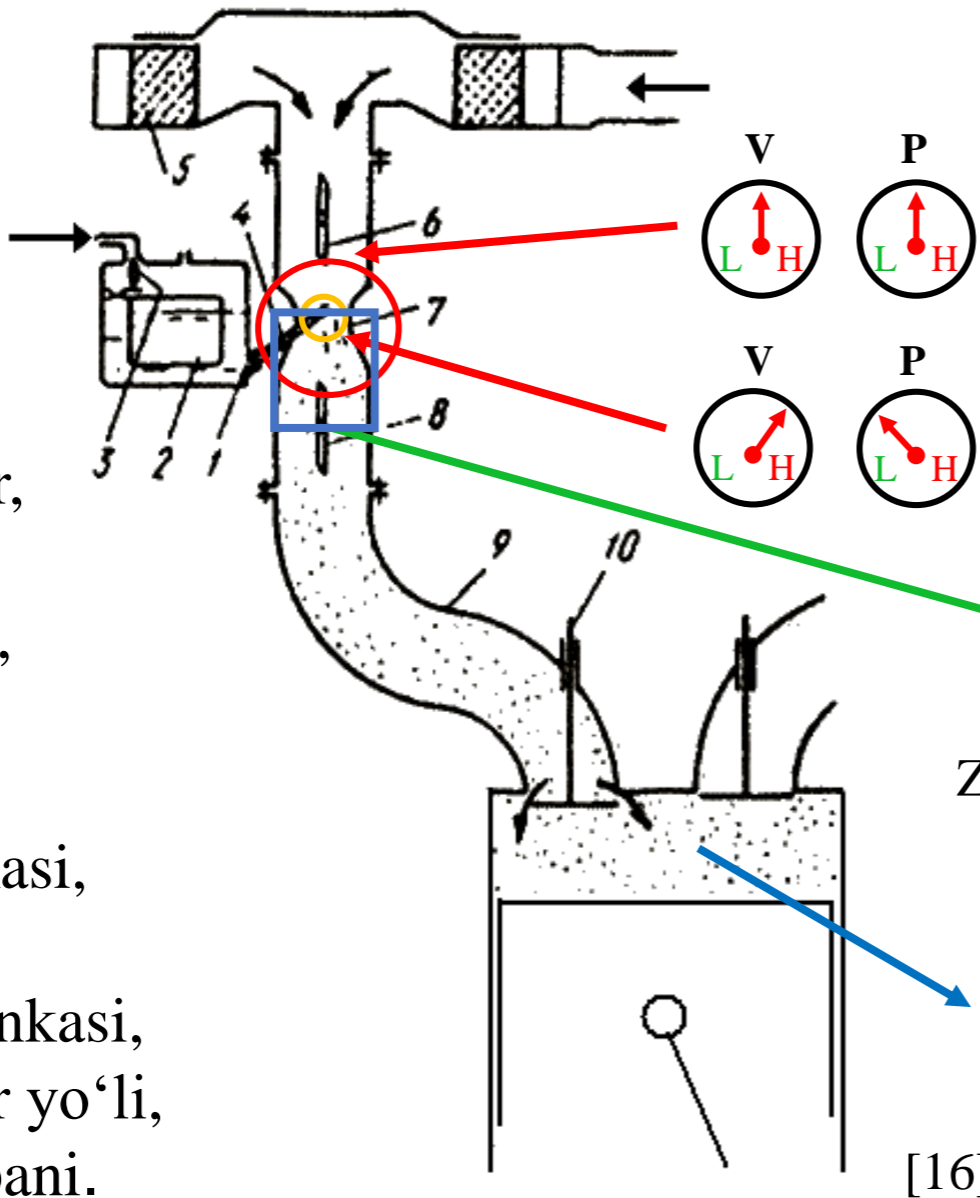
Kambag‘al aralashmaning alanganish chegarasi ($\alpha \approx 1,4$) \downarrow .

Sodda karbyurator:

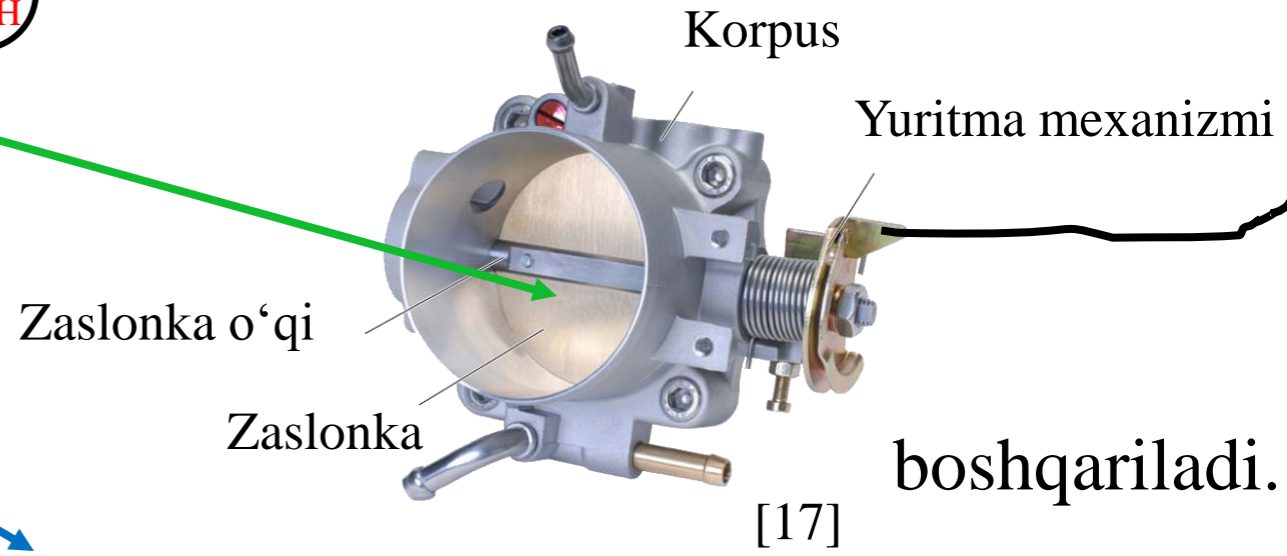
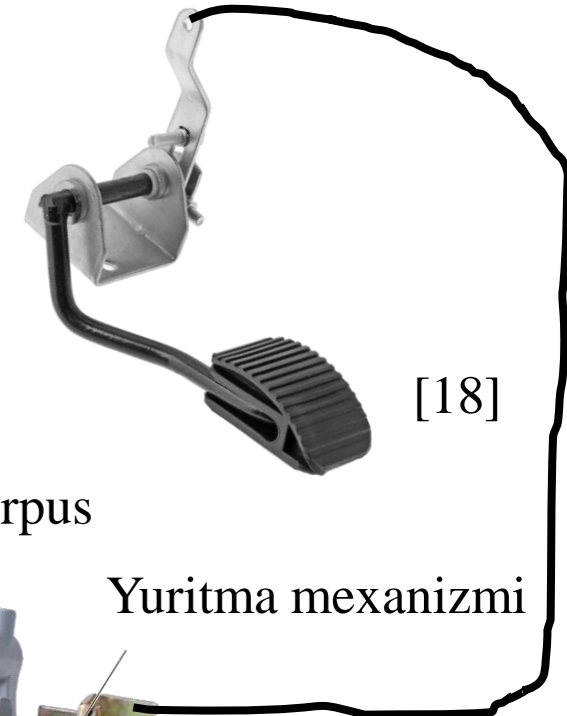
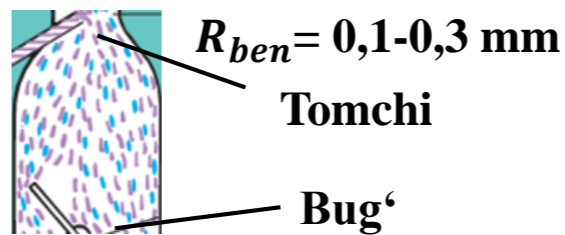
$$V = 150-200 \text{ m/s}$$

$$V_{ben} = \frac{150 - 200 \text{ m/s}}{25}$$

- 1-asosiy jiklyor,
- 2-qalqovich,
- 3-ninali klapan,
- 4-to'zitgich,
- 5-havo filtri,
- 6-havo zaslonkasi,
- 7-diffuzor,
- 8-drossel zaslonkasi,
- 9-kiritish quvur yo'li,
- 10-kiritish klapani.



Aralashtirgich kamerasi



Aralashma miqdori

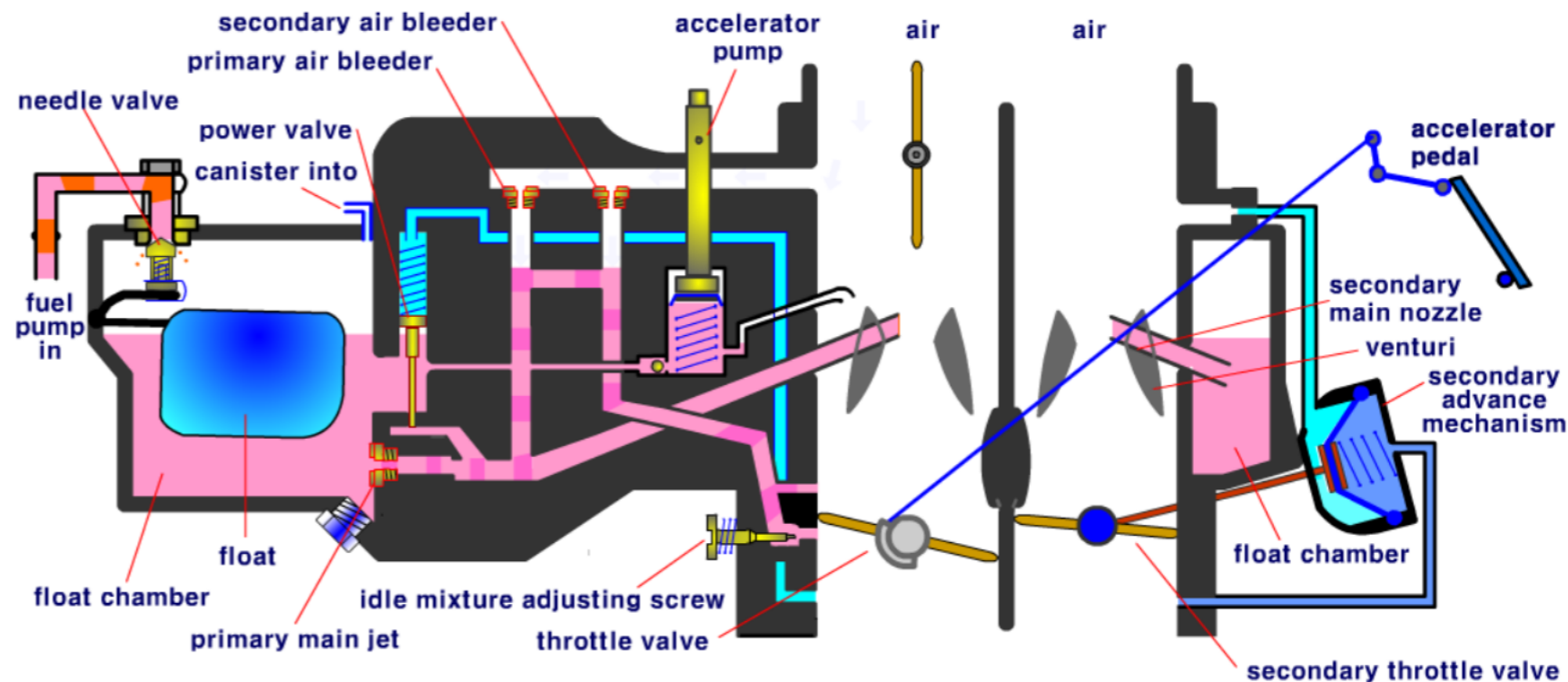
boshqariladi.

Salt; ————— O‘rtacha; Yuqori; yuklanish ya boshqa rejimlarda ishlaydi.

Rejimga mos ravishda yonilg‘i aralashmasini tayyorlash uchun karbyurator quyidagi

qurilmalarga ega:

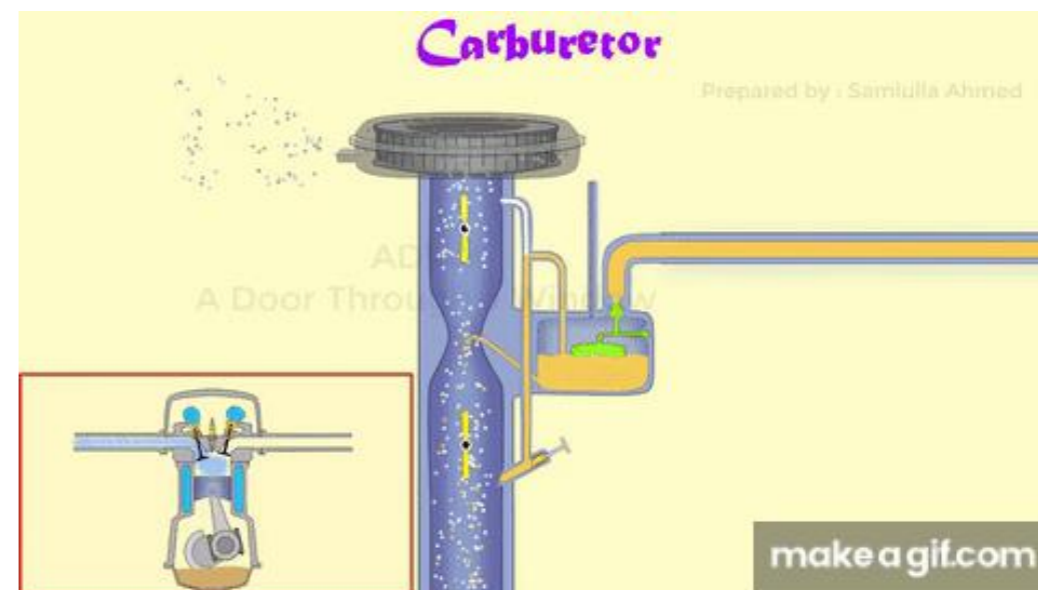
- Ishga tushirish qurilmasi;
- Bosh dozlovchi qurilma;
- Salt ishlash tizimi;
- Ekonomayzer;
- Tezlatish nasosi.



[19]

mos yonuvchi aralashma tarkibi quyidagilardan iborat:

- Dvigatelni ishga tushirish ($\alpha \approx 0,4 \div 0,6$);
- Salt ishlash va kichik yuklanish ($\alpha \approx 0,6 \div 0,8$);
- O‘rtacha yuklanish ($\alpha \approx 1,05 \div 1,15$) **tejamli aralashma**;
- To‘la yuklanish ($\alpha \approx 0,85 \div 0,95$)
quvvatli aralashma;
- Kichik va o‘rtacha yuklanishdan to‘la yuklanishga keskin o‘tish (**tezlanish**).

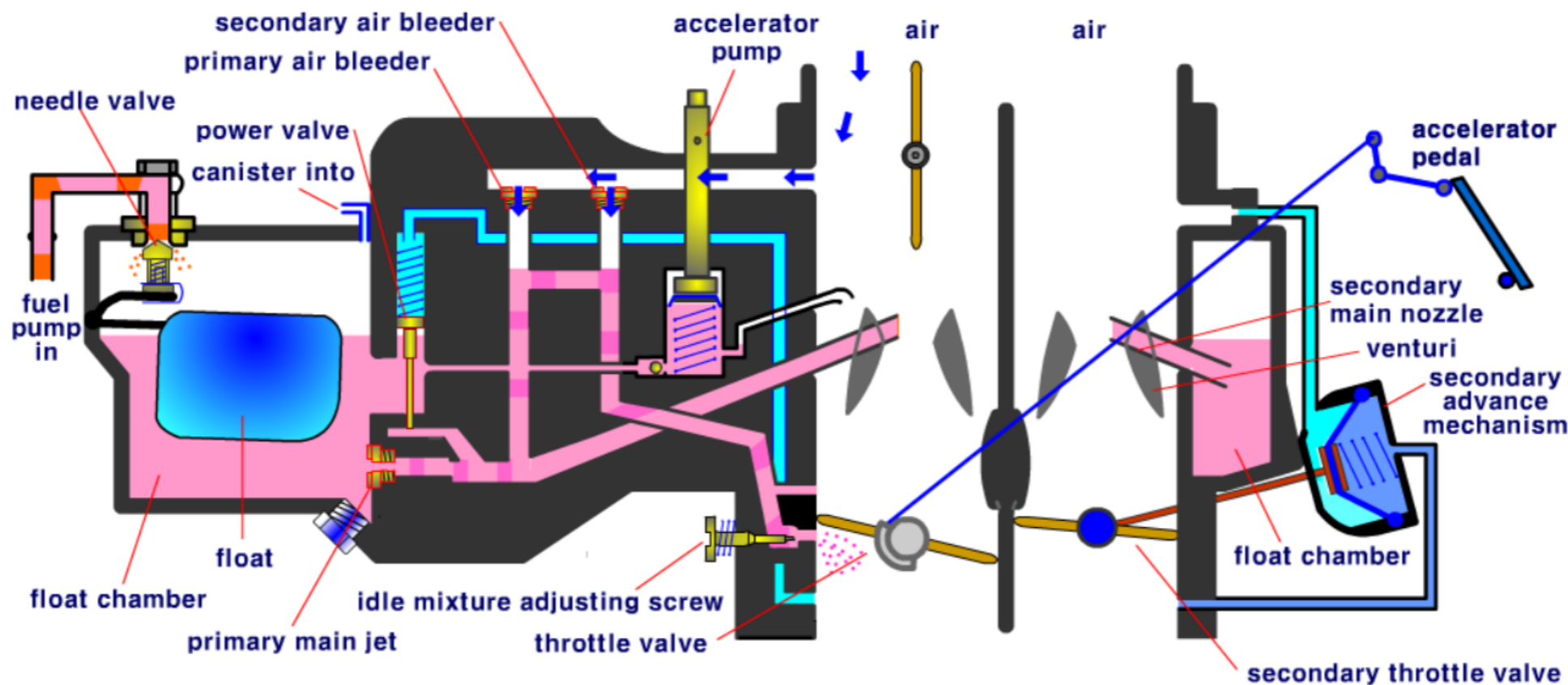


[20]

Ishga tushirish qurilmasi - sovuq dvigatelni ishonchli o't olishi uchun

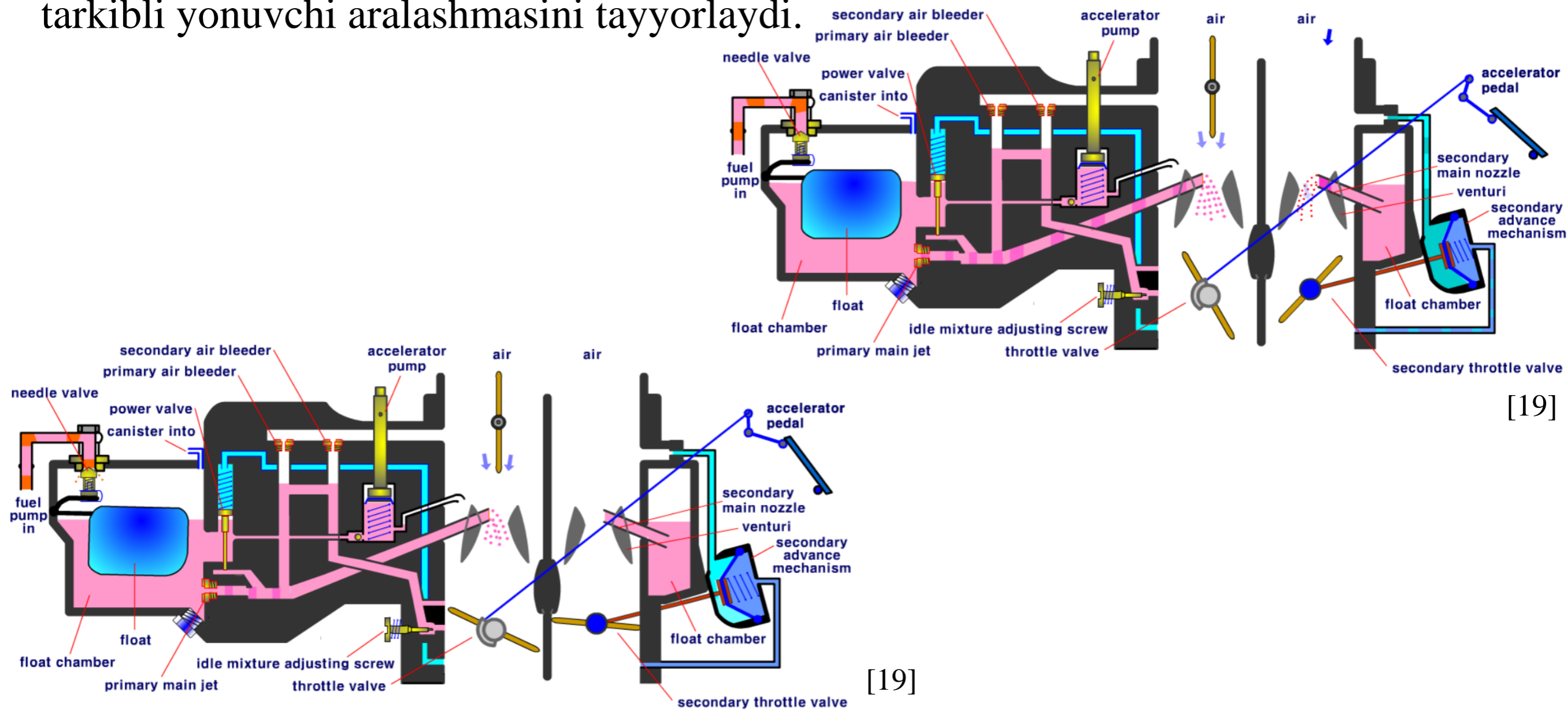
rejimga mos yonilg' i aralashmasi tayyorlaydi.

Salt ishlash tizimi - tirsakli valning minimal aylanish chastotasida turg'un ishlashi uchun aralashma tayyorlaydi.



[19]

tarkibli yonuvchi aralashmasini tayyorlaydi.



[19]

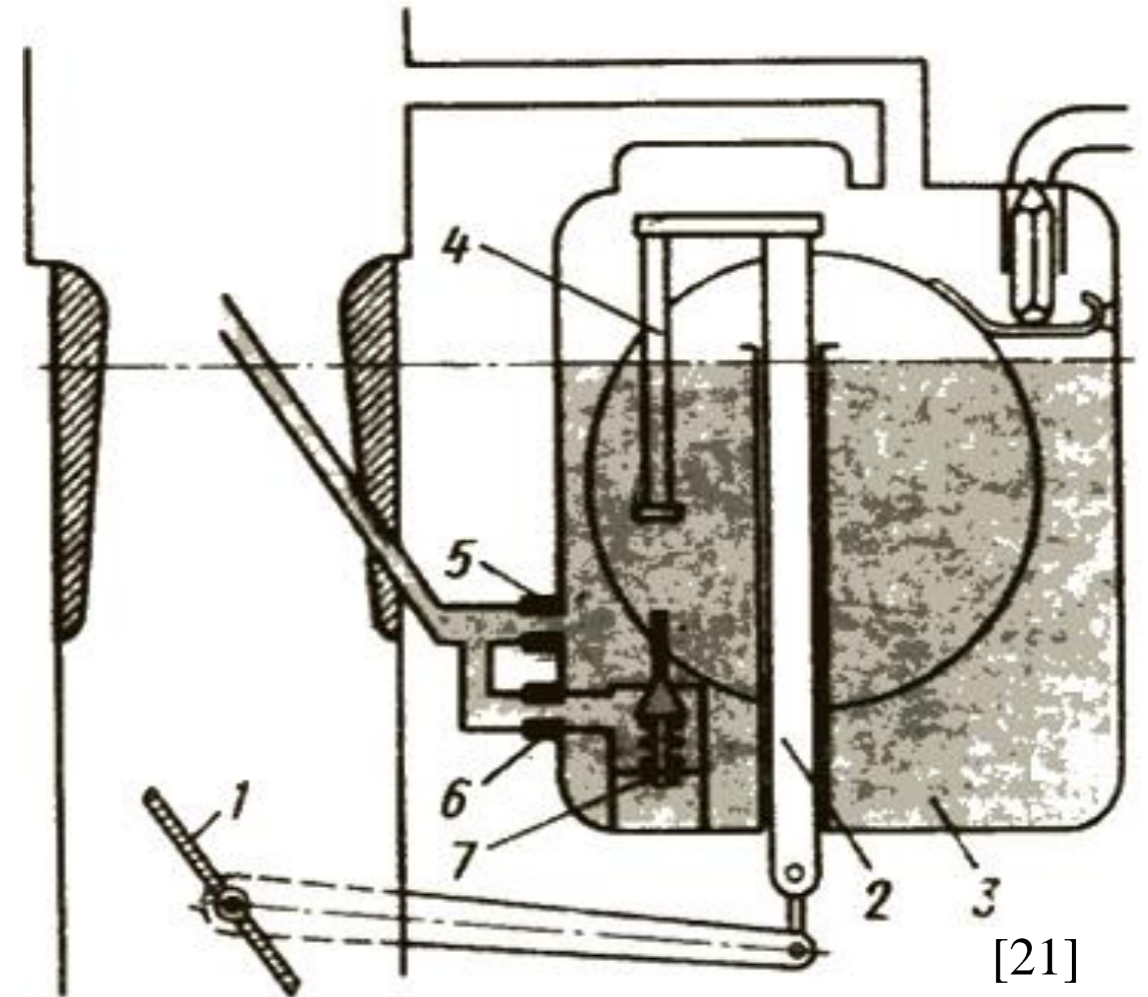
[19]

Ekonomayzer to'la quvvat olish uchun **boyitilgan aralashma**

tayyorlashga xizmat qiladi.

Ekonomayzer yordamida maksimal yuklanish rejimida yonilg'i sarfi ↑ va qisman yuklanishga o'tishda ↓.

Dvigatelning qisman yuklanishda tejamkorligi ta'minlanadi.

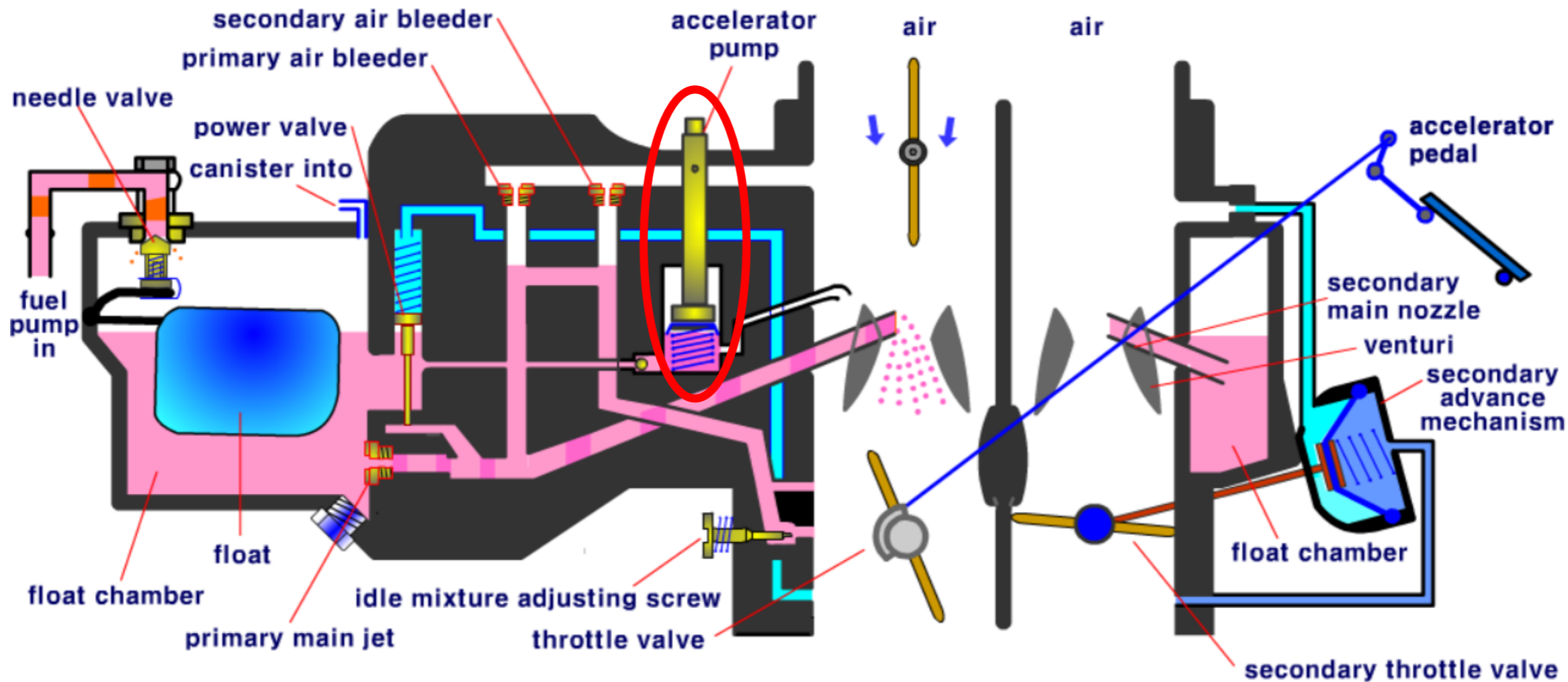


Mexanik yuritmalı ekonomayzer:

1-drossel zaslonkasi; 2-qo'zg'aluvchan ustun; 3-qalqovichli kamera; 4-turtklch; 5-bosh dozalovchi qurilmaning yonilg'i jiklyori; 6-ekonomayzer jiklyori; 7-ekonomayzer klapani.

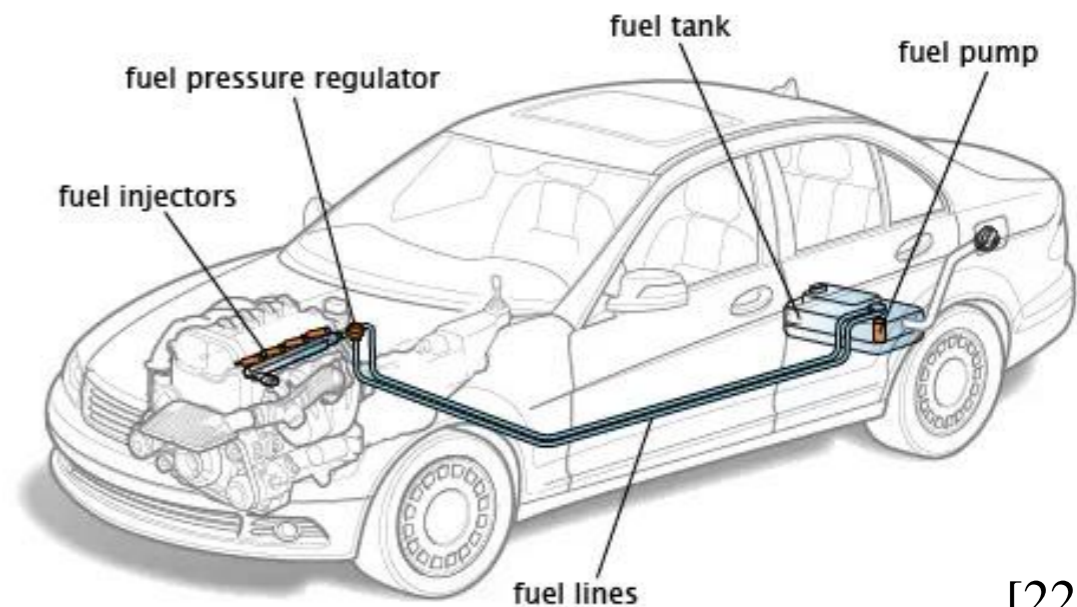
Tezlatish nasosi - avtomobilning keskin dinamik harakatini

ta'minlash uchun aralashmani tezkor boyitib berishga xizmat qiladi.



7.2. Ta'minlash tizimi qismlarining konstruksiyasi va ishlashi.

- Yonilg'i baki;
- Yonilg'i va havoni tozalash asboblari;
- Yonilg'i nasosi;
- Kiritish va chiqarish quvurlari;
- So'ndirgich.



[22]

Image courtesy of ClearMechanic.com

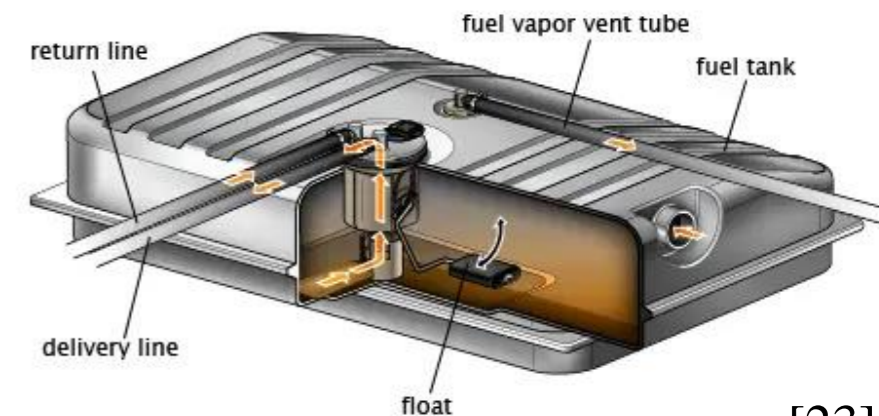
Yonilg'i baki yonilg'ini saqlash uchun mo'ljallangan.

Varaqli po'latdan

400...500 km

Yonilg'i chayqalmasligi uchun

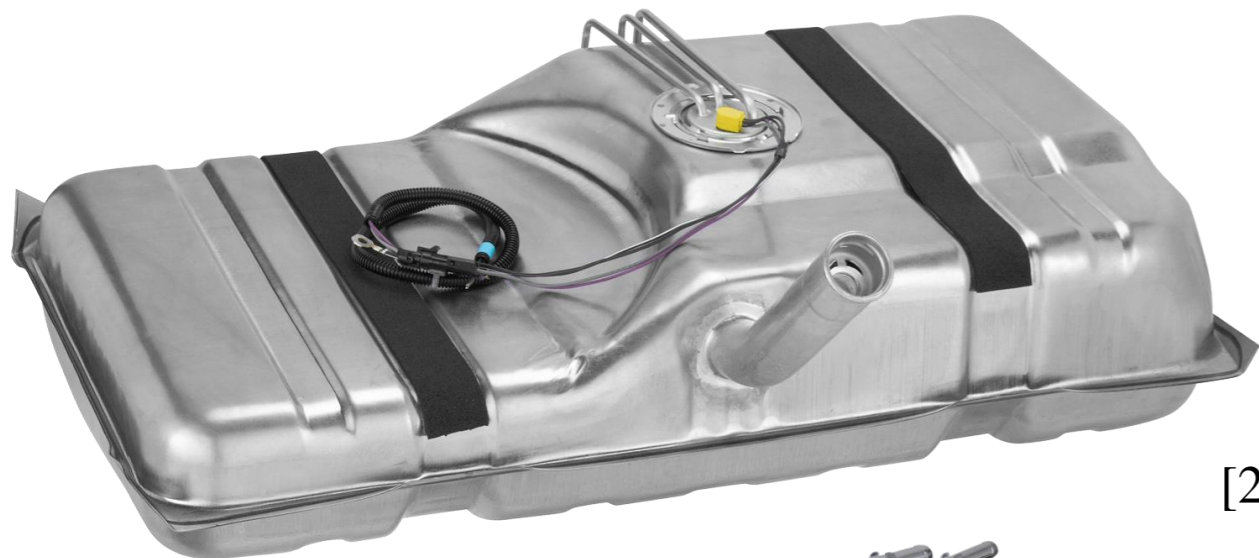
Bakning ichida pardevor (to'siqchalar) qilinadi.



[23]

Image courtesy of ClearMechanic.com

Klassik yonilg‘i baki



[24]



[26]

Zamonaviy yonilg‘i baki



[25]

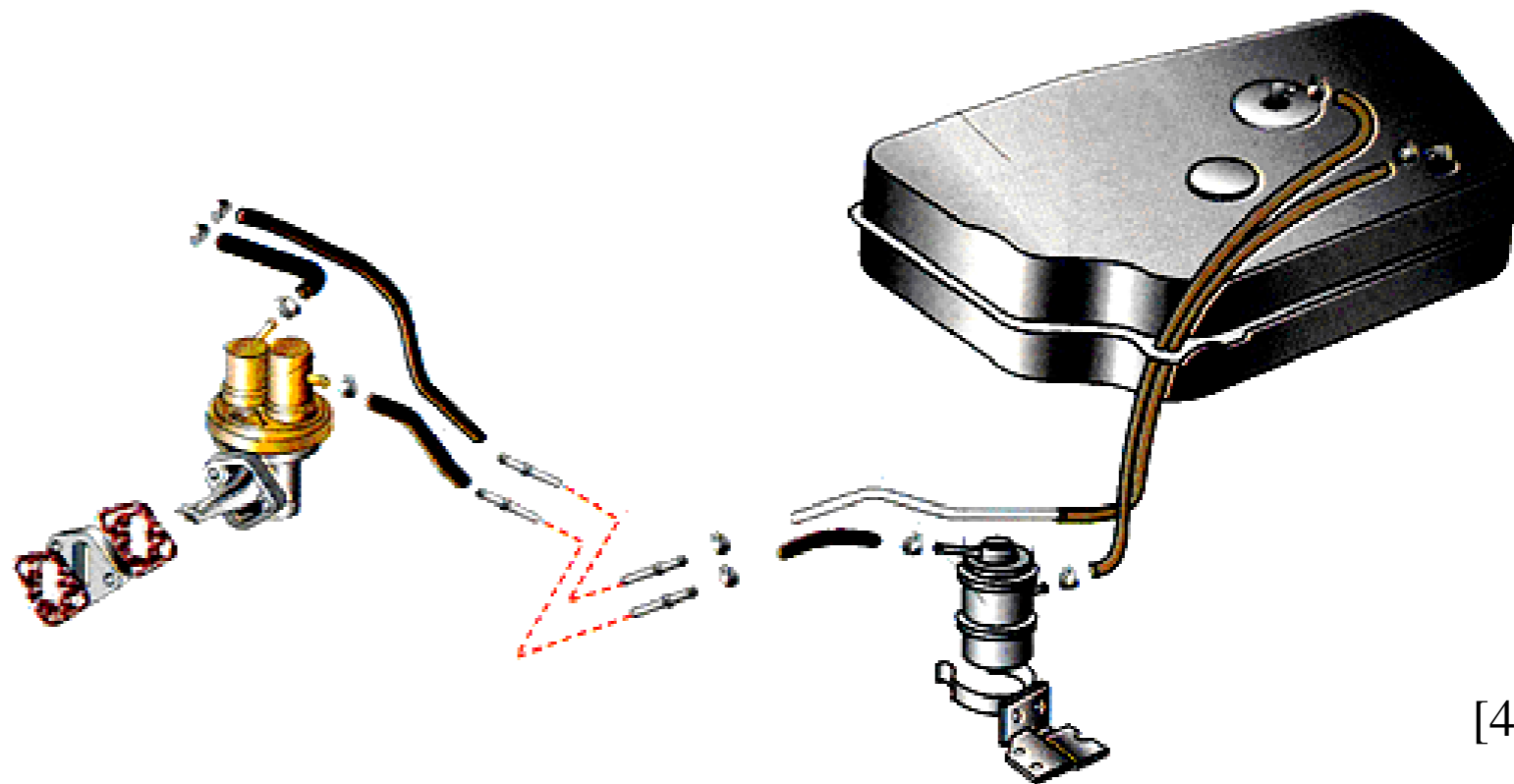


[27]

Yonilg'ini tozalash asboblari:

Yonilg'i tarkibida har xil mexanik aralashmalar (**chang, zang, tola**) va suvni ushlab qolishga mo'ljallangan.

Bu asboblarga yonilg'ini karbyuratorga uzatish tarmog'iga o'rnatiladigan har xil filtrlar va tindirgichlar kiradi.

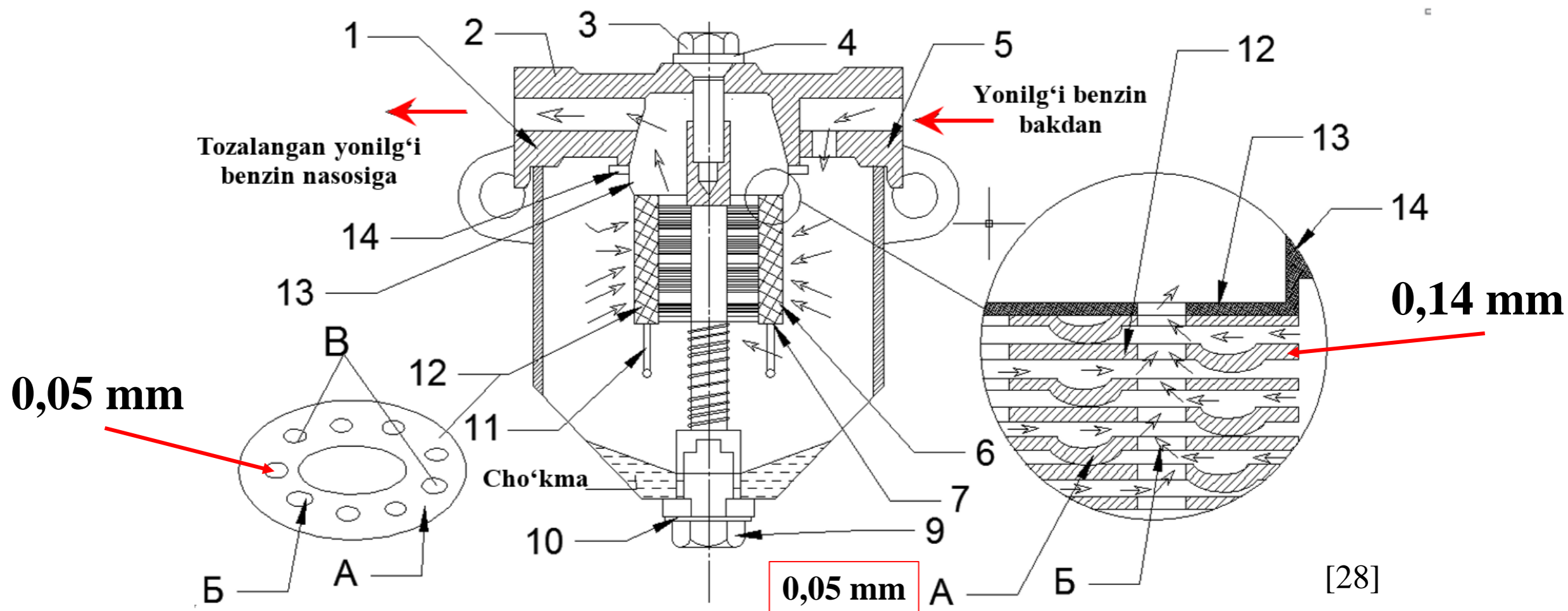


[4]

quyidagicha:

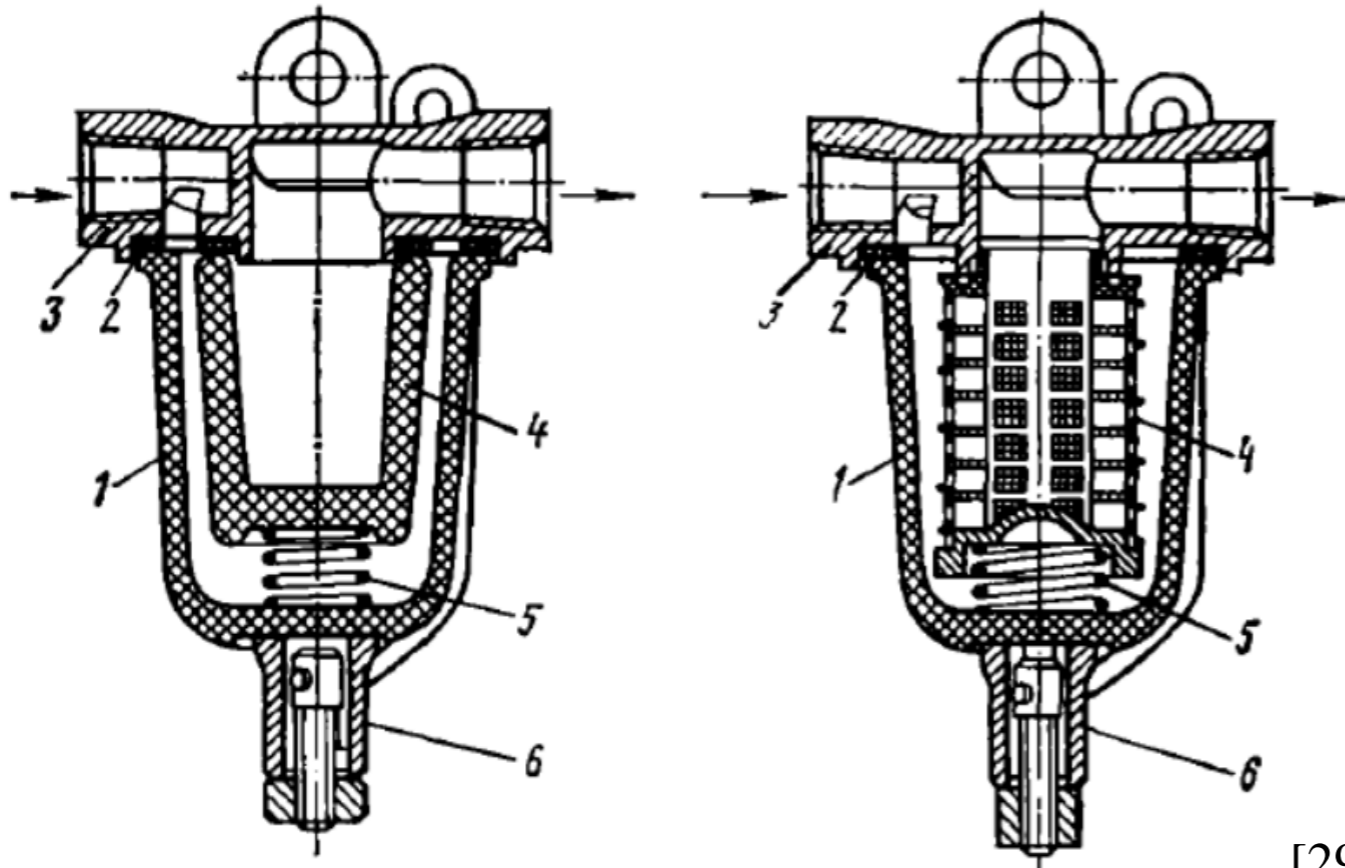
- **Quyish bo'g'zining to'rli filtrida bakni yonilg'i bilan to'ldirishda filtrlanadi;**
- **Yonilg'i bakining tubida tindiriladi;**
- **So'rish trubkalarining to'rli filtrlarida;**
- **Tarmoq filtr-tindirgichida;**
- **Yonilg'i nasosining to'rli filtrlarida (ba'zi bir turdagi nasoslarda);**
- **Mayin tozalash yonilg'i filtrida;**
- **Karbyuratorning to'rli filtrida.**

Yonilg'ining tarmoq filtr tindirgichi



1-stakan; 2-qopqoq; 3-bolt; 4,5,10 va 14-qistirmalar; 6-filtrlovchi element; 7-tayanch shayba; 8-prujina; 9-tiqin; 11-sterjen; 12-plastina; 13-filtrlovchi element korpusi; A-chiqiq (bo'rtiq); B va B-teshiklar.

Mayin tozalash yonilg'i filtrlari

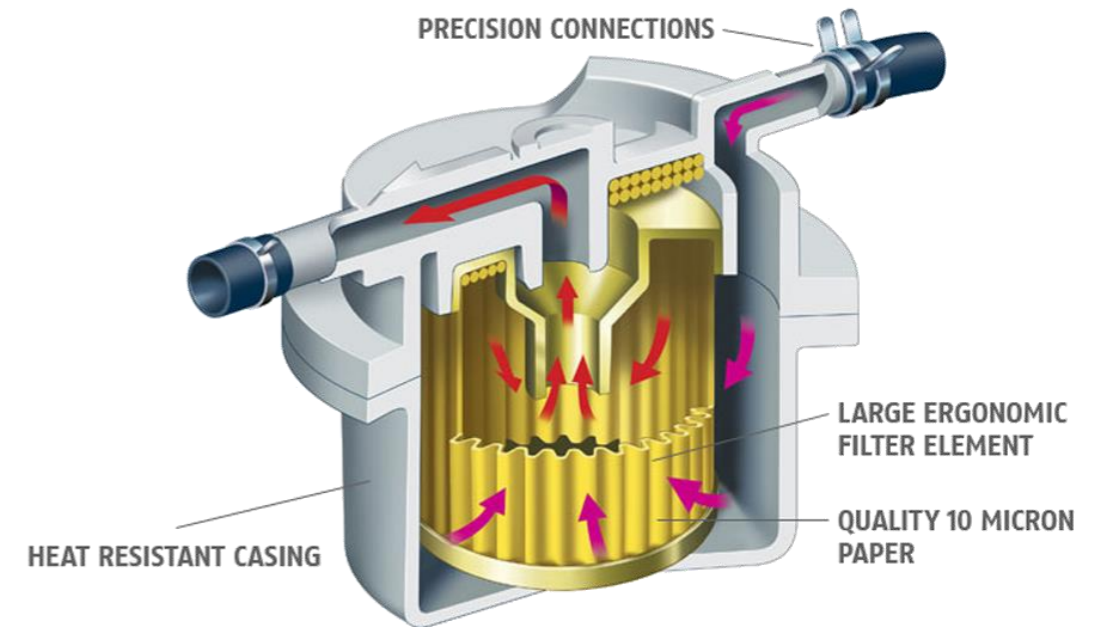


Keramika elementli

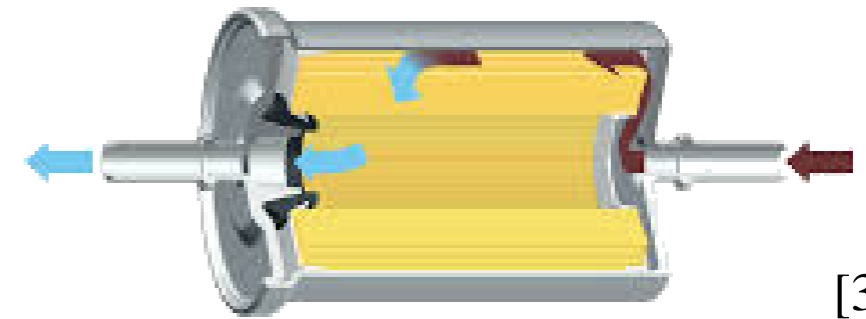
To'qli elementli

1-stakan-tindirgich; 2-qistirma; 3-qopqoq;
4-filtrlovchi element; 5-prujina; 6-stakan qisqichi.

[29]



[30]



[31]

Havoni tozalash asboblari:

Havo tarkibidagi **chang** silindrlarga kirishi natijasida dvigatel **detallari tez yeyiladi.**

Shuning uchun ta'minlash tarmog'iga havo filtri o'rnatiladi.

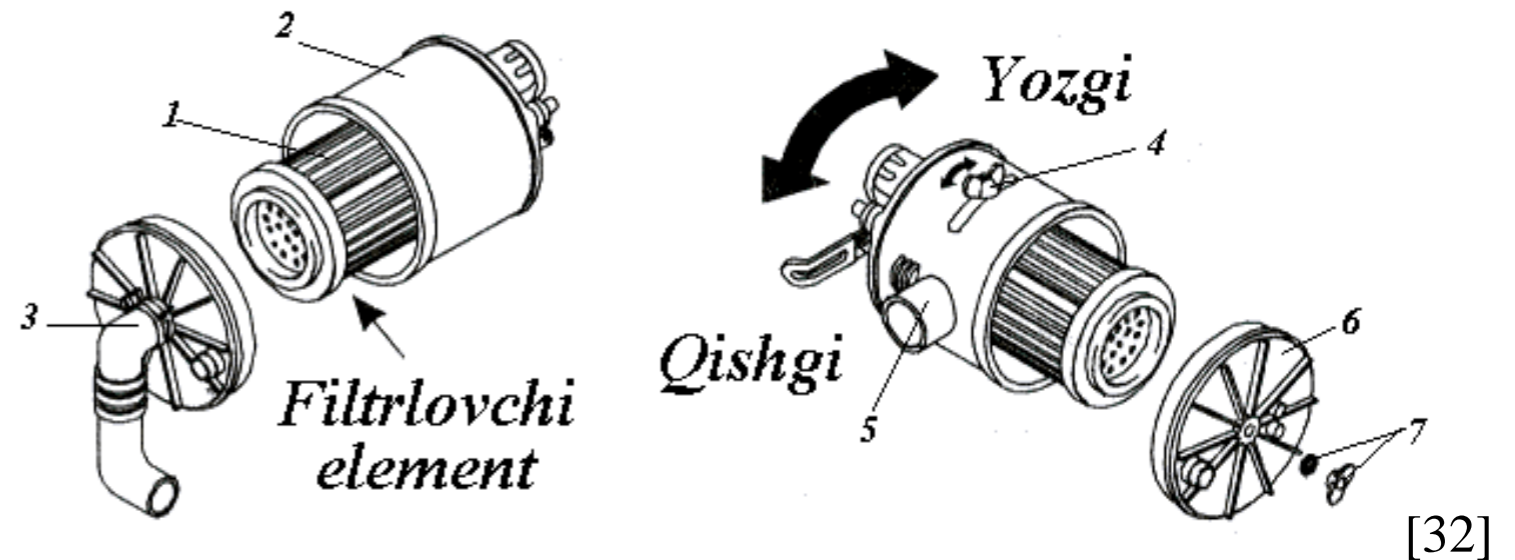
U dvigatel silindrlariga kiradigan havoni changdan tozalash uchun xizmat qiladi.

1-havo filtr; 2-korpus;

3-havo kiritish quvuri;

4-yozgi va qishki mavsumga mo'ljallangan
surgich; 5-toza havoni chiqarish quvuri;

6-qopqoq; 7-bolt va shayba.

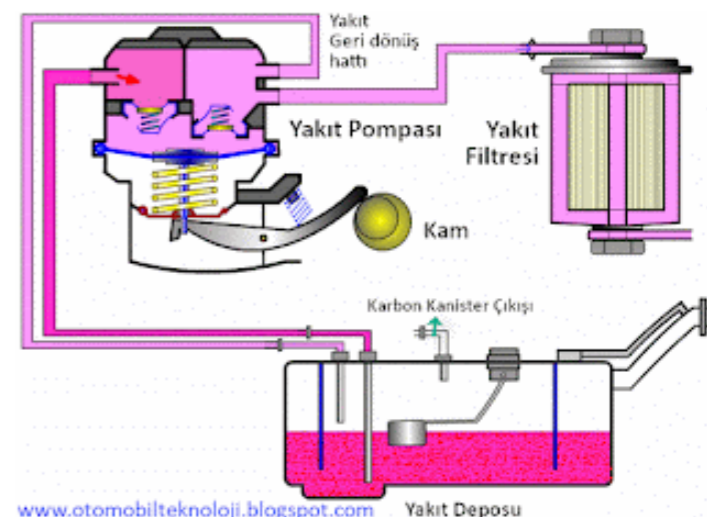
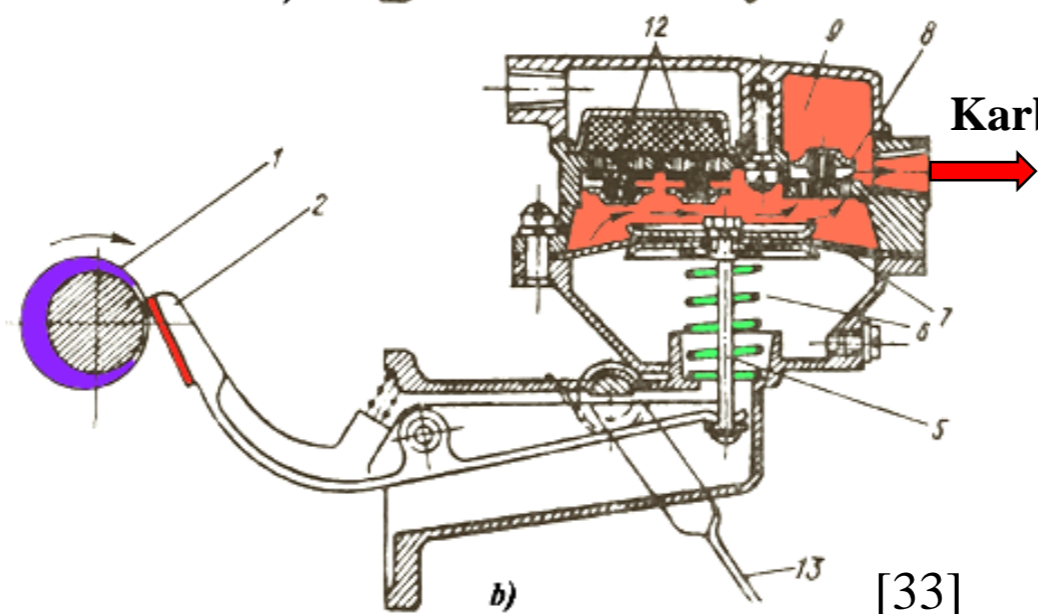
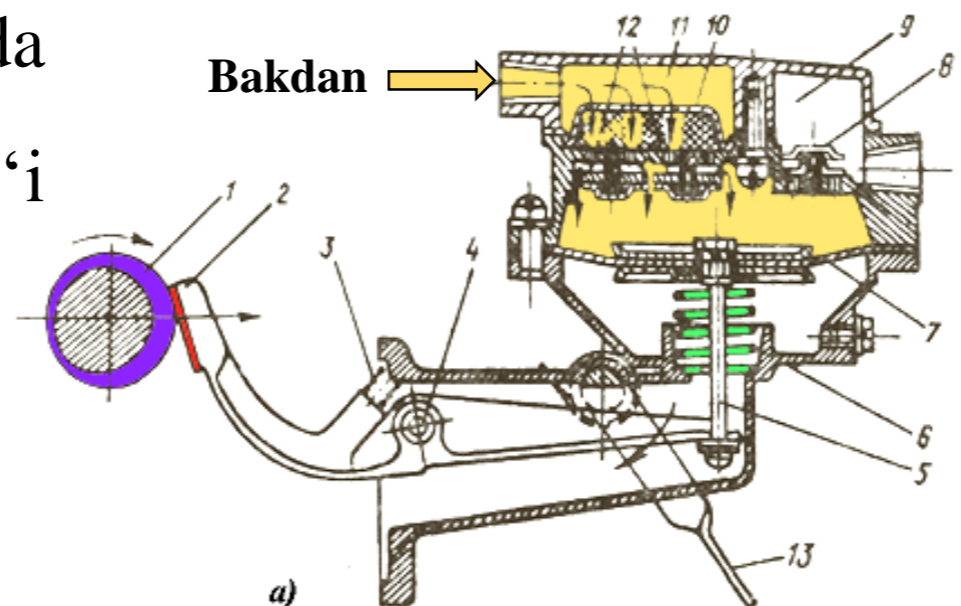


Damas avtomobilining havo tozalash filtri.

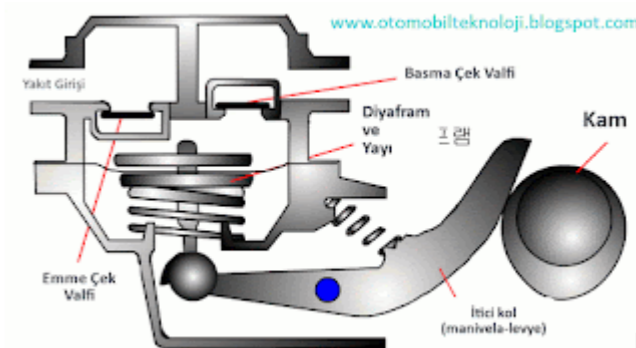
Yonilg'i nasosi:

Karbyuratorli dvigatellarda diafragma turidagi yonilg'i nasosi ishlatiladi.

- 1-taqsimlash valining eksstrigri;
- 2-koromislo;
- 3,6-prujina;
- 4-koromislo o'qi;
- 5-tirgak;
- 7-diafragma;
- 8-chiqarish klapani;
- 9-yonilg'ini haydash bo'linmasi;
- 10-to'r filtr;
- 11 – yonilg'ini kiritish bo'linmasi;
- 12-kiritish klapani;
- 13-richag.



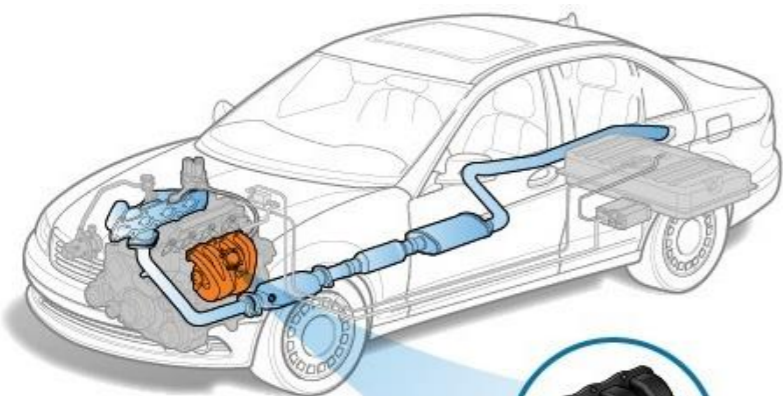
[34]



[35]

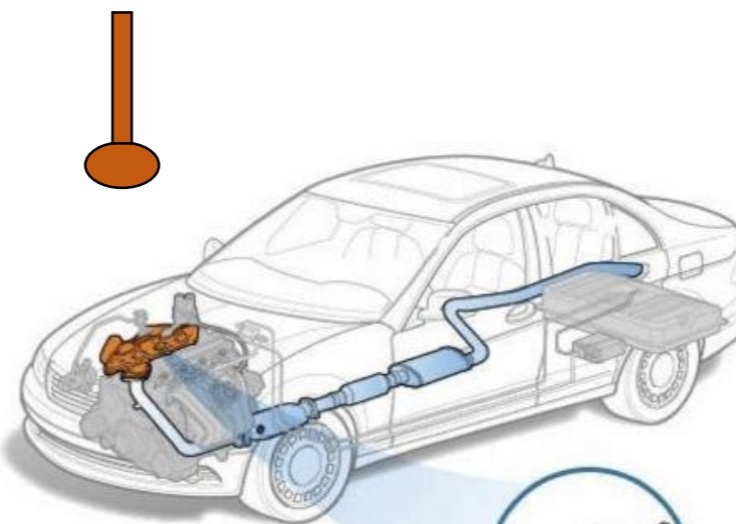
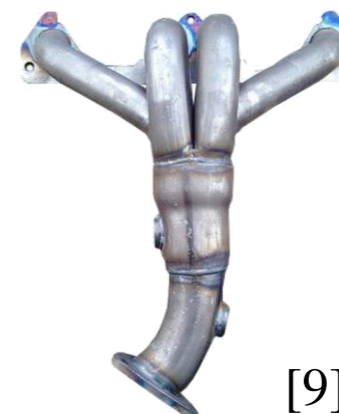
Kiritish va chiqarish quvurlari:

Kiritish quvuri



POLOSEDAN.RU

Chiqarish quvuri



Выпускной коллектор

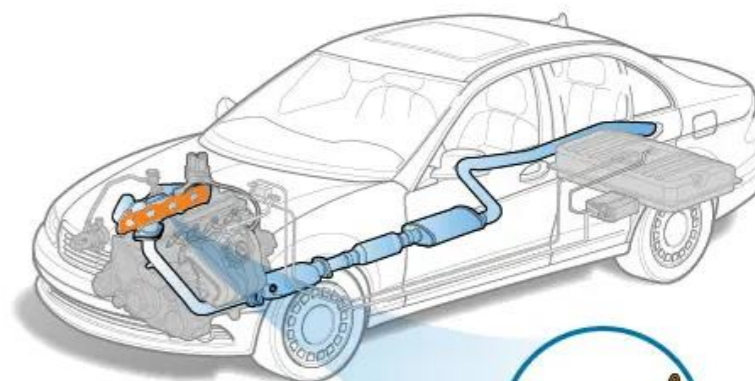
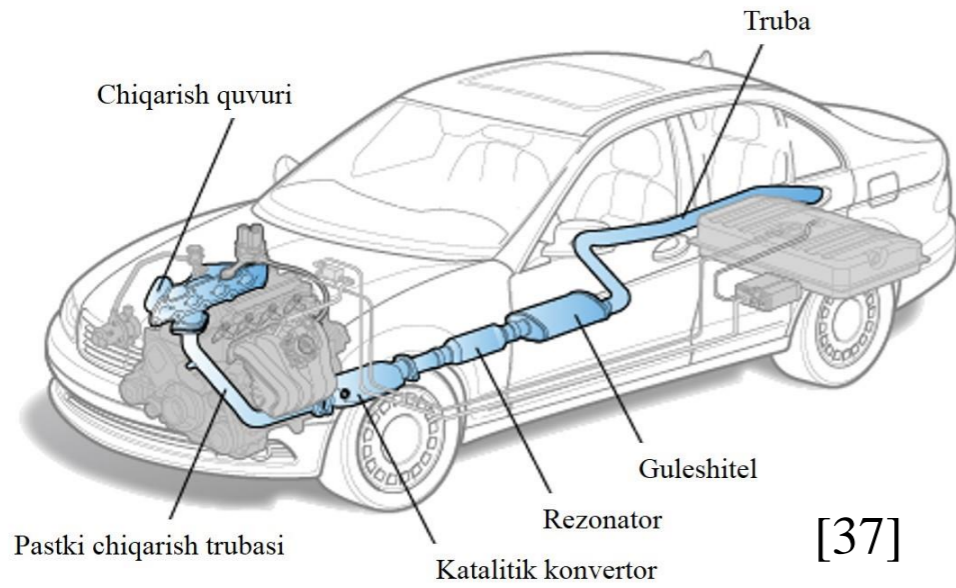


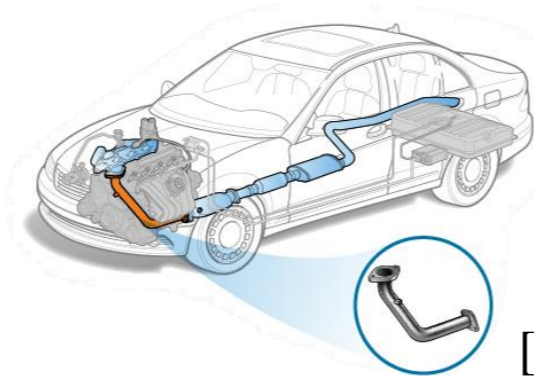
Image courtesy of ClearMechanic.com



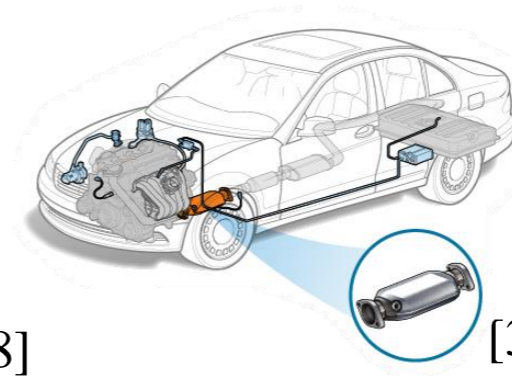
Chiqarish tarmog'i:



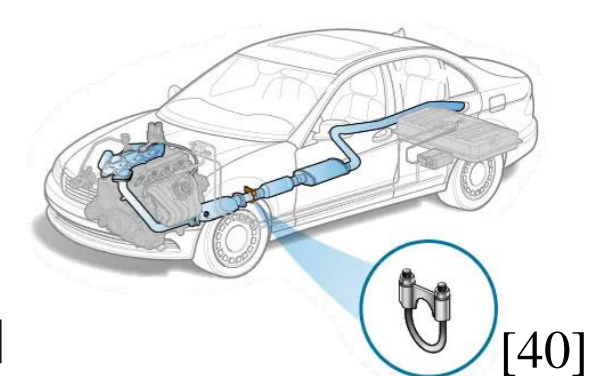
[37]



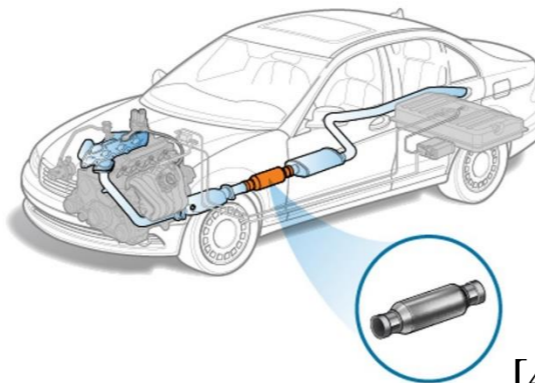
[38]



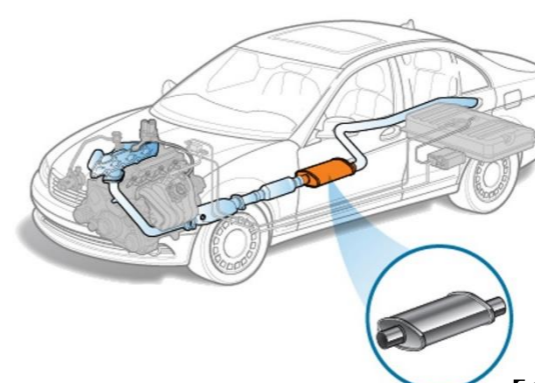
[39]



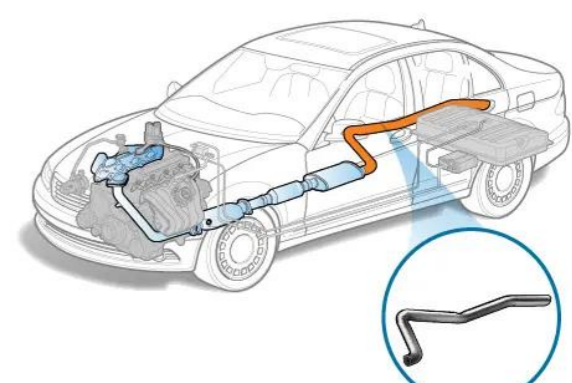
[40]



[41]

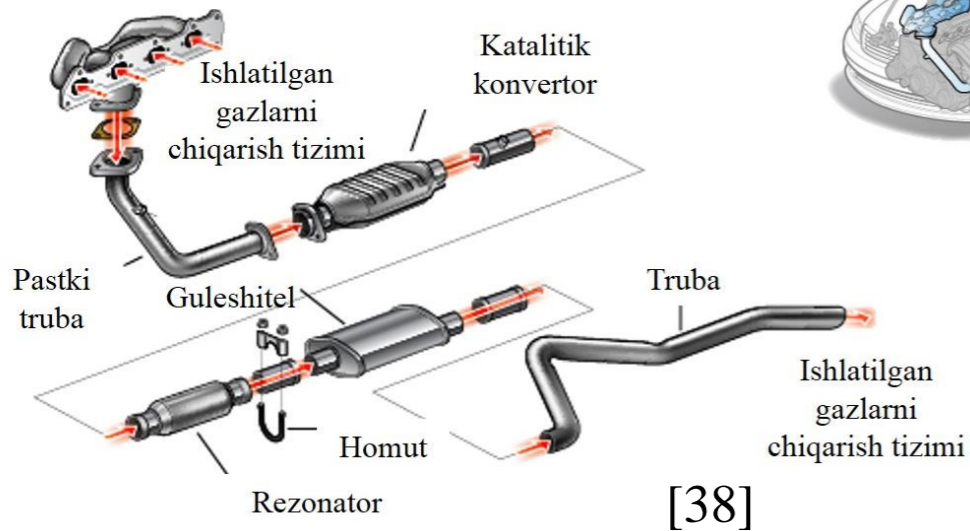


[11]



[42]

Image courtesy of ClearMechanic.com



[38]



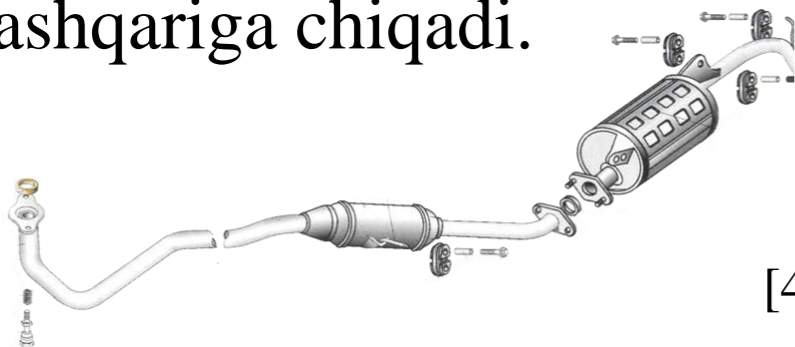
Soʻndirgich:

Dvigatel silindrlaridan ishlatilgan **gazlar katta tezlikda** shiddat bilan harakatlanib,

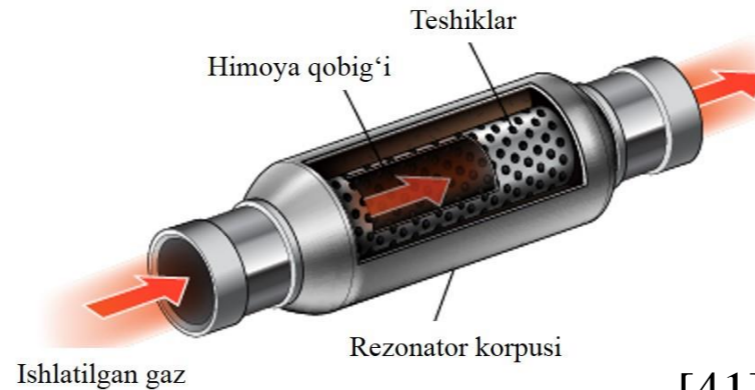
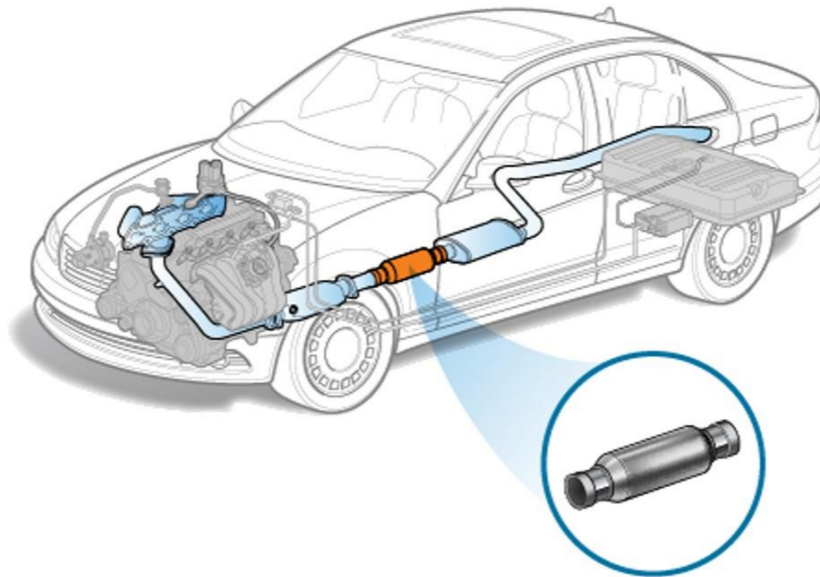
alanga va uchqun

aralash shovqin

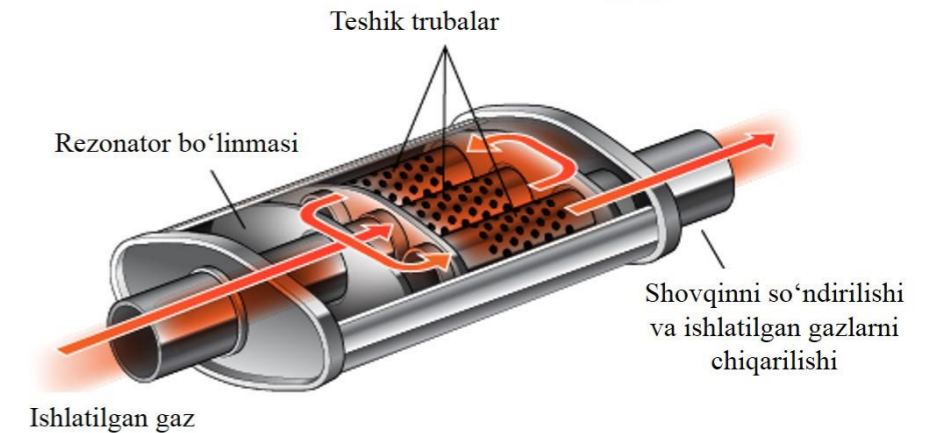
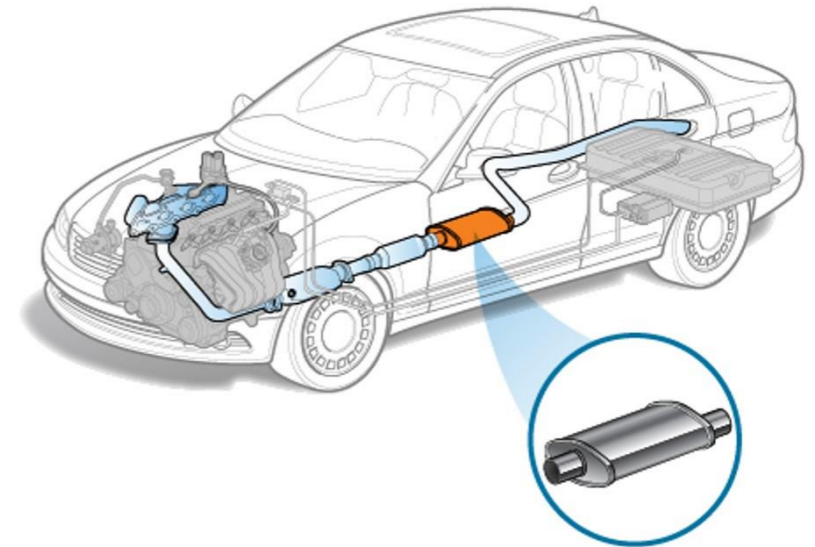
tashqariga chiqadi.



[4]



[41]



[11]

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