Mavzu:

Qattiq jismning aylanma xarakat dinamikasi. Kuch momenti. Inertsiya momenti

Reja:

1) Qattiq jismning aylanma harakat dinamikasi. Kuch momenti. Inertsiya momenti.

2) Shteyner teoremasi.

3) Aylanma harakat dinamikasining asosiy qonuni.

Aylanama harakat deb shunday harakatga aytiladiki, bunda jism barcha nuqtalarining traektoriyalari, markazi aylanish o`qi deyiluvchi bitta chiziqda bo`lgan konsentrik aylanalardan iborat bo`ladi. Qattiq jismni aylanma harakatga keltirish uchun unga biror kuch ta’sir etishi kerak.

Qattiq jismning aylanma harakatini dinamika nuqtai nazardan tekshirilganda kuch tushunchasi bilan bir qatorda kuch momenti tushunchasi, massa tushunchasi bilan bir qatorda inersiya momenti tushunchasi ham kiritiladi

Kuch momenti. Aylanish o`qiga ega bo`lgan biror jismga kuch ta’sir etganda uning qanday harakat qilishi faqat bu kuchning son qiymatiga bog`liq bo`lmay, uning yo`nalishi va qo`yilishiga ham bog`liq. Bularning hammasini birgalikda hisobga olish uchun kuch momenti kattaligi qabul qilingan.

Inersiya momenti. Biror m massali nuqtaviy jismning aylanish o`qiga nisbatan inersiya momenti deb uning massasini aylanish radiusining kvadratiga ko`paytmasi bilan ifodalanuvchi kattalikka aytiladi. $I=mR^2$ qattiq jismning inersiya momenti uning qismlari inersiya momentlarining yig`indisiga teng.

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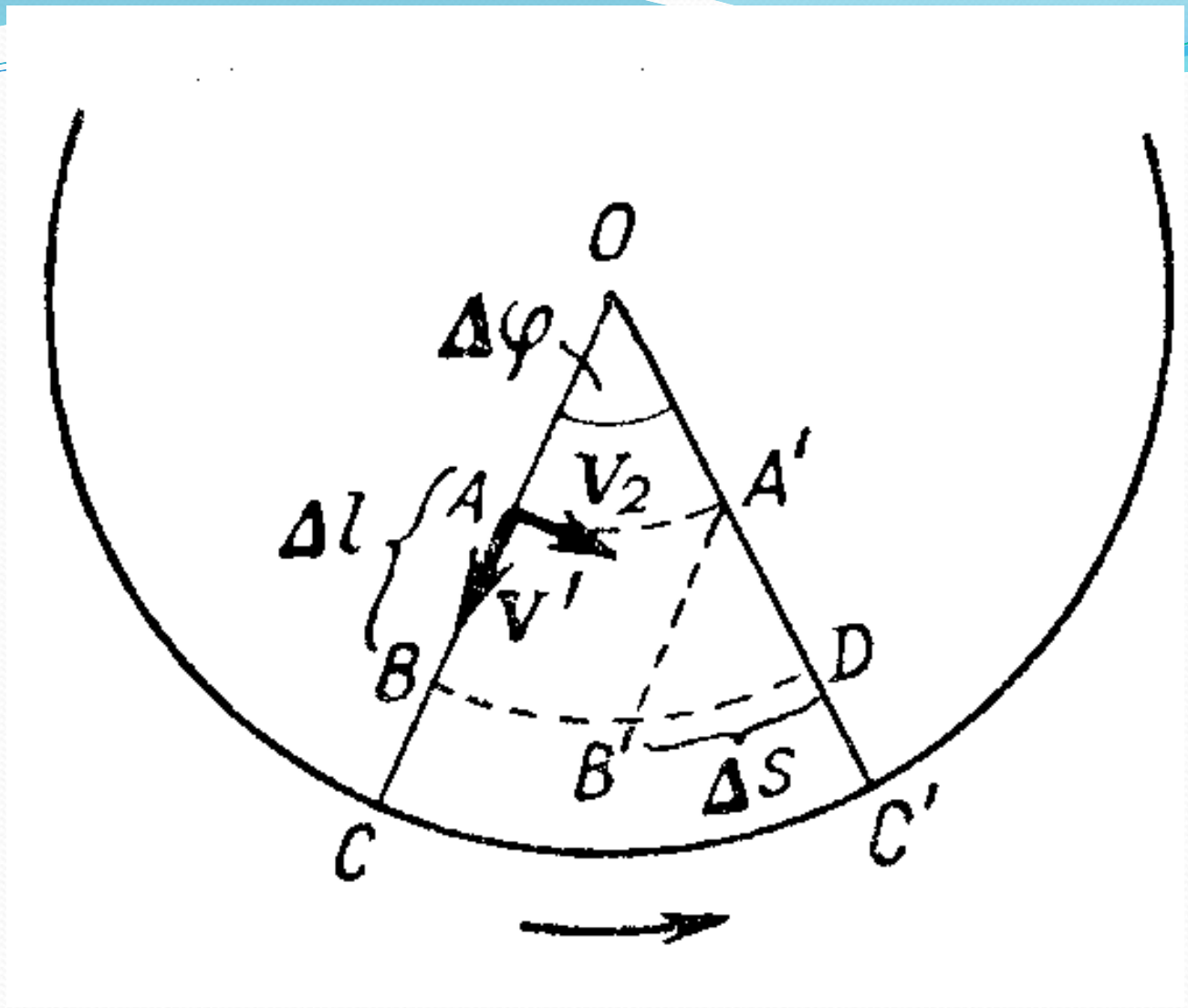
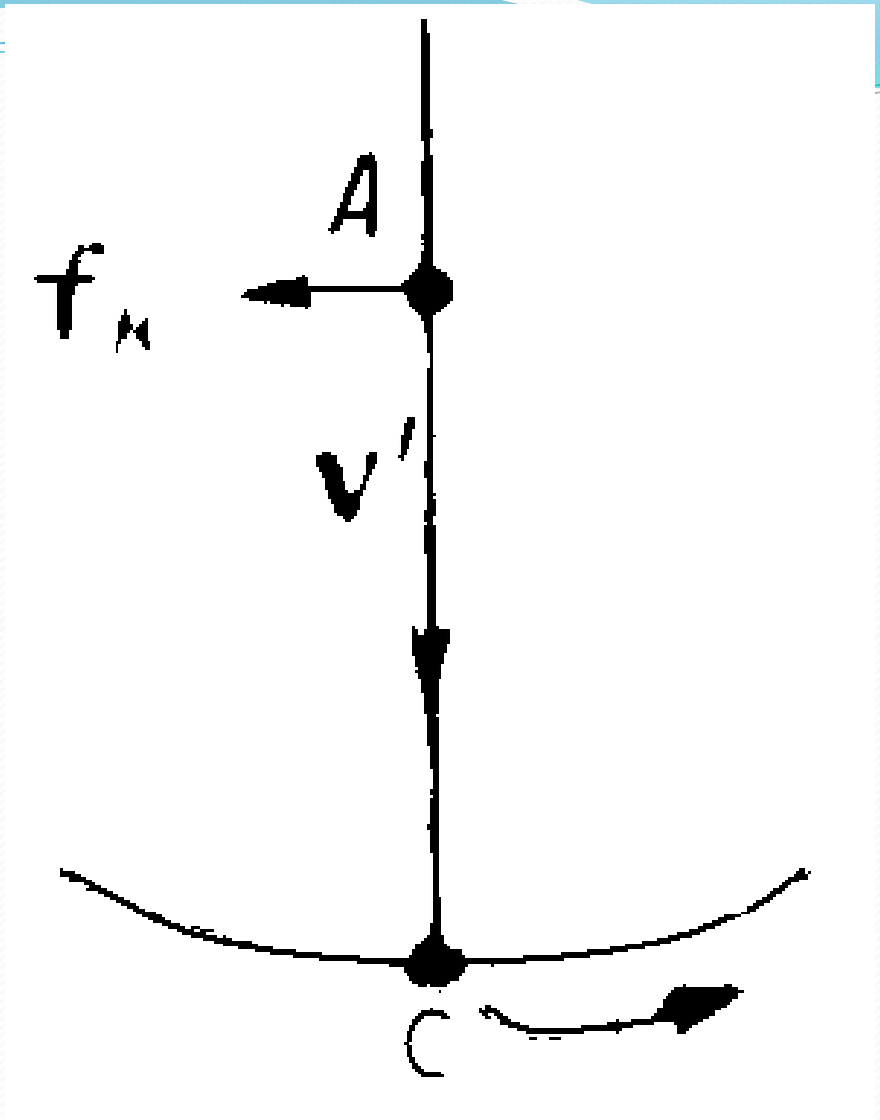
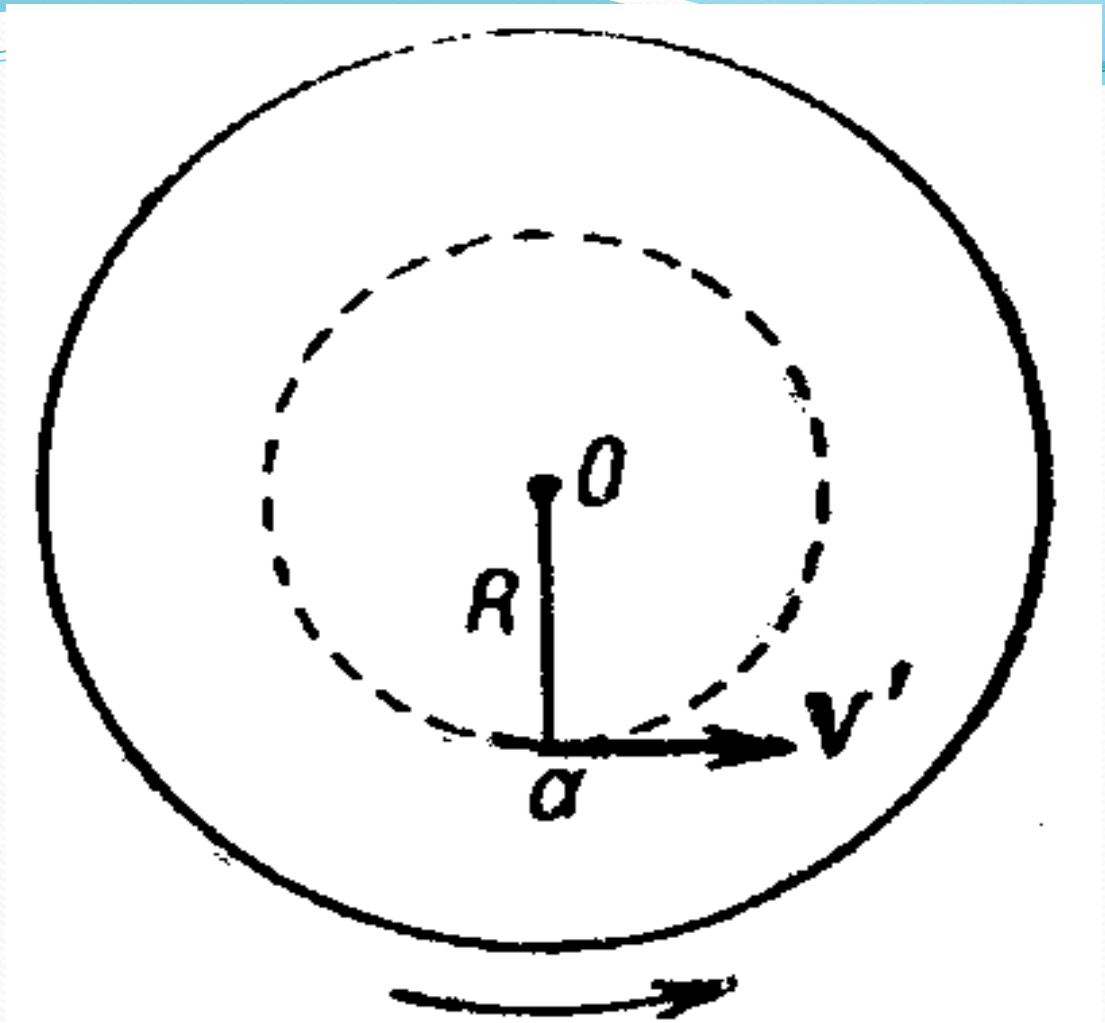


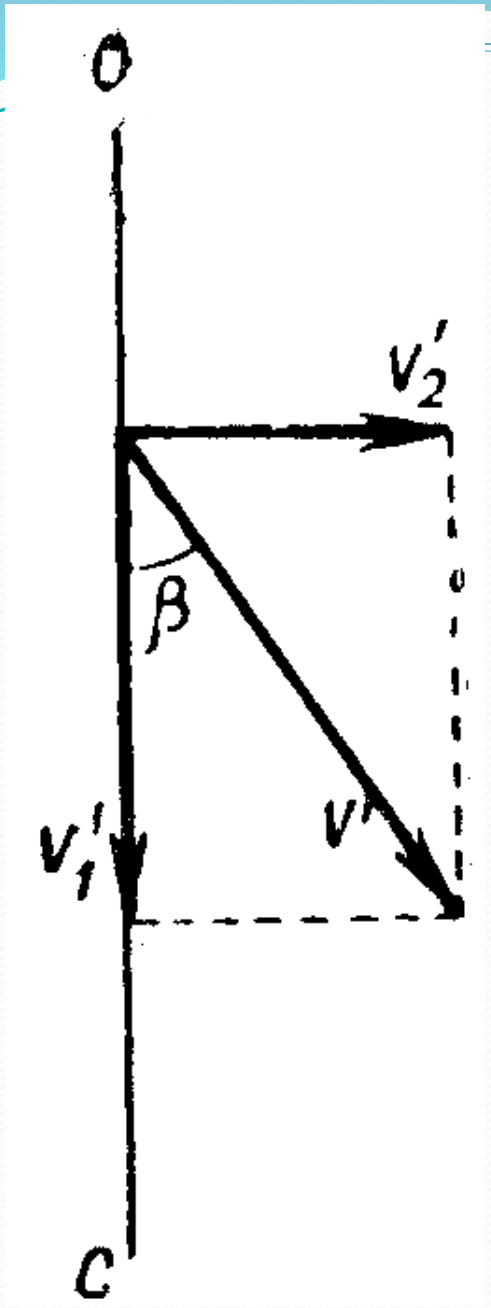
Jismning aylanayotgan disk radiusi bo'yicha harakati



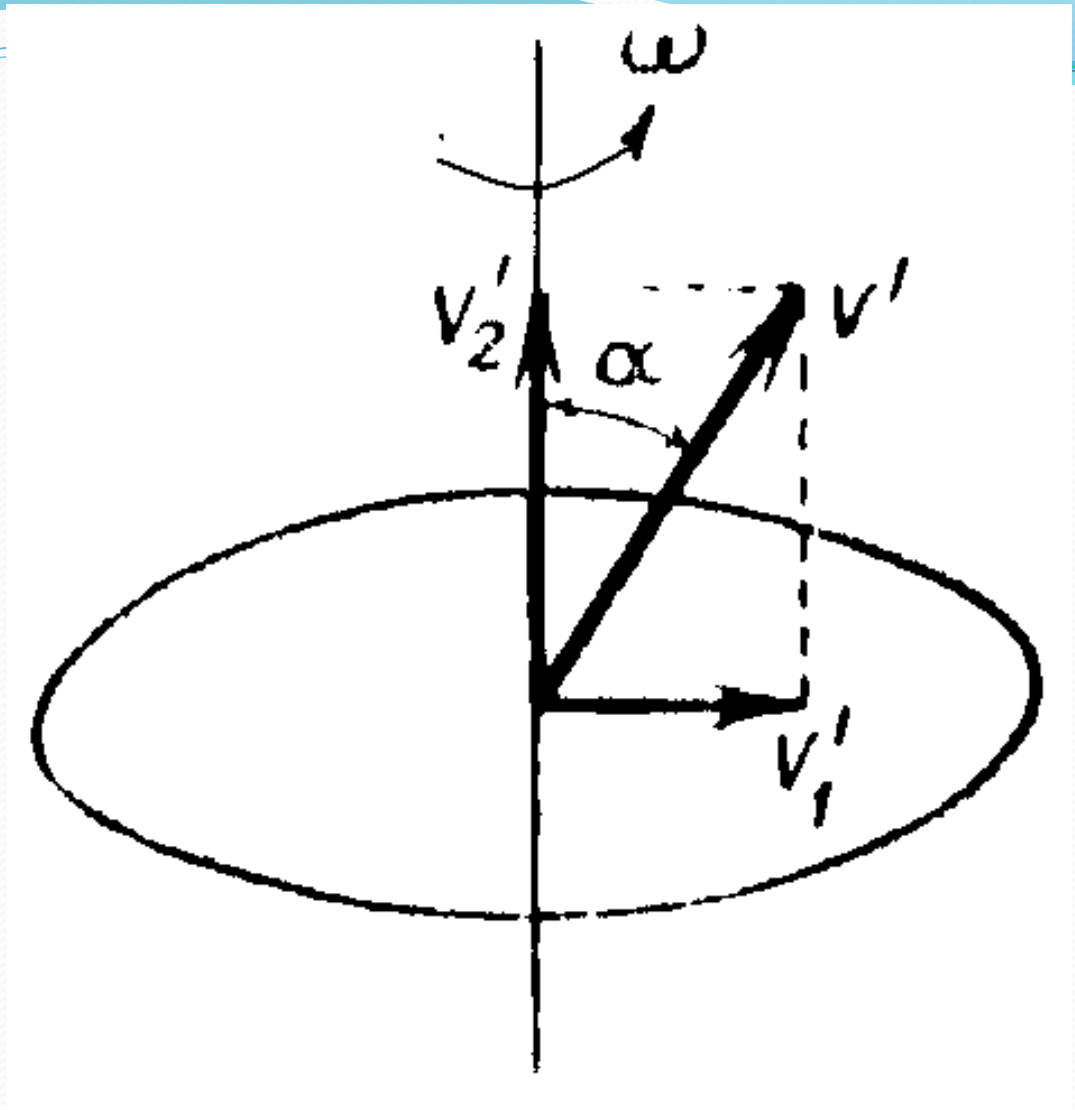
Jism aylanuvchi disk radiusi bo’yicha harakatlanayotganda Koriolis kuchining yo’nalishi



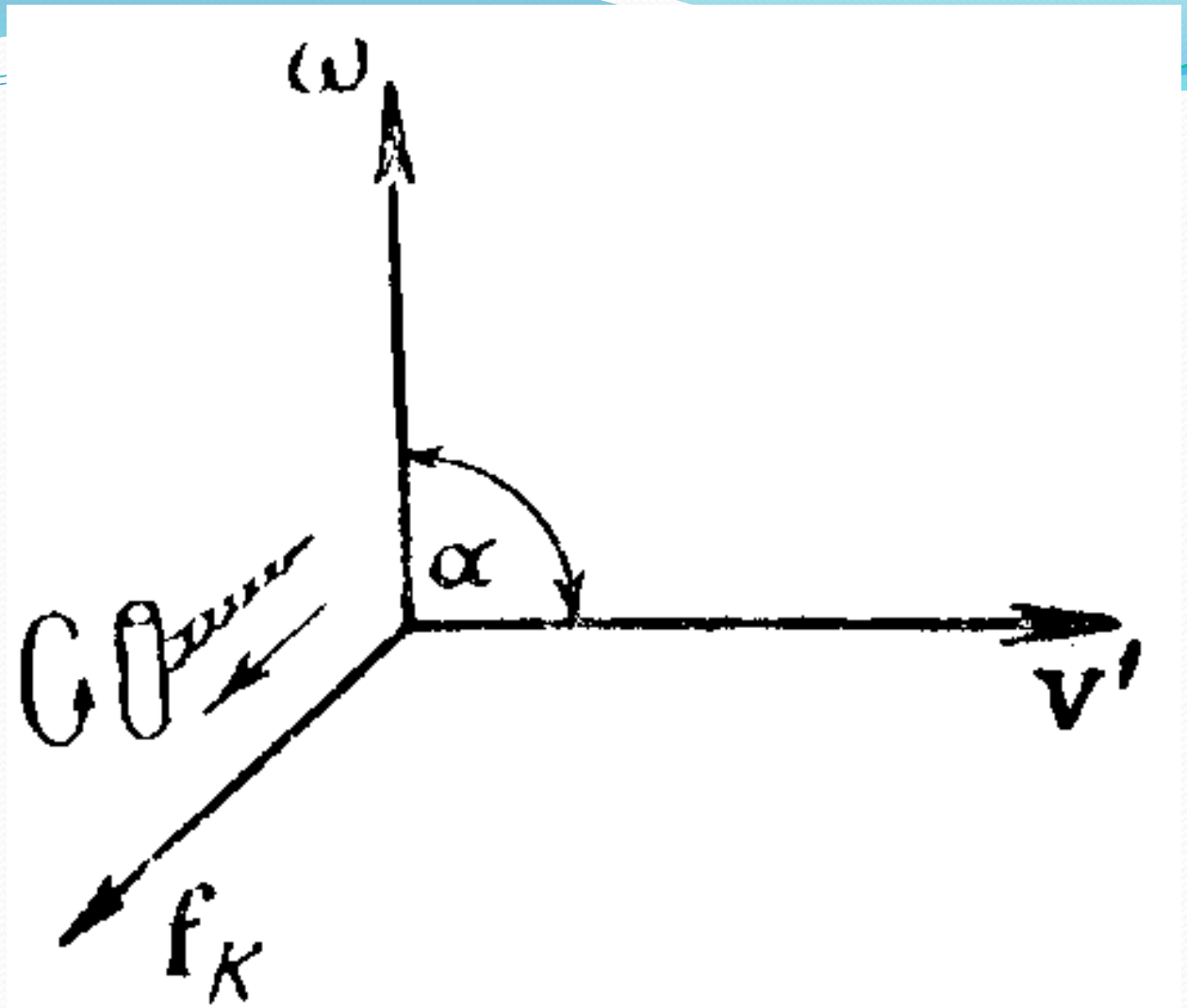
Aylanayotgan disk ustidagi jismning disk bilan kontsentrik bo’lgan aylana bo’yicha harakati



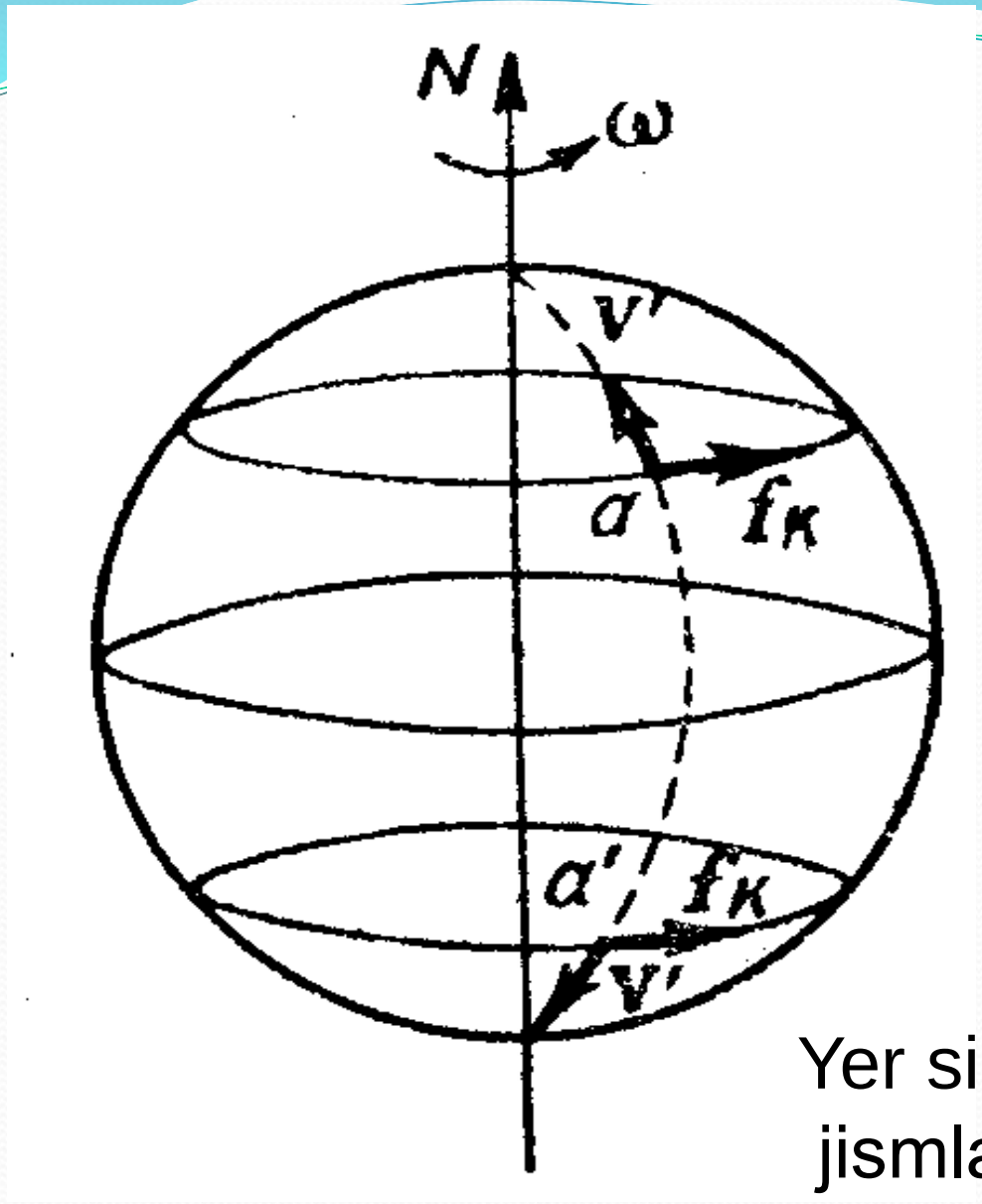
Nisbiy tezlikni radius bo’yicha yo’nalgan V_1 tashkil etuvchiga va radiusga tik V_2 tashkil etuvchiga ajratish



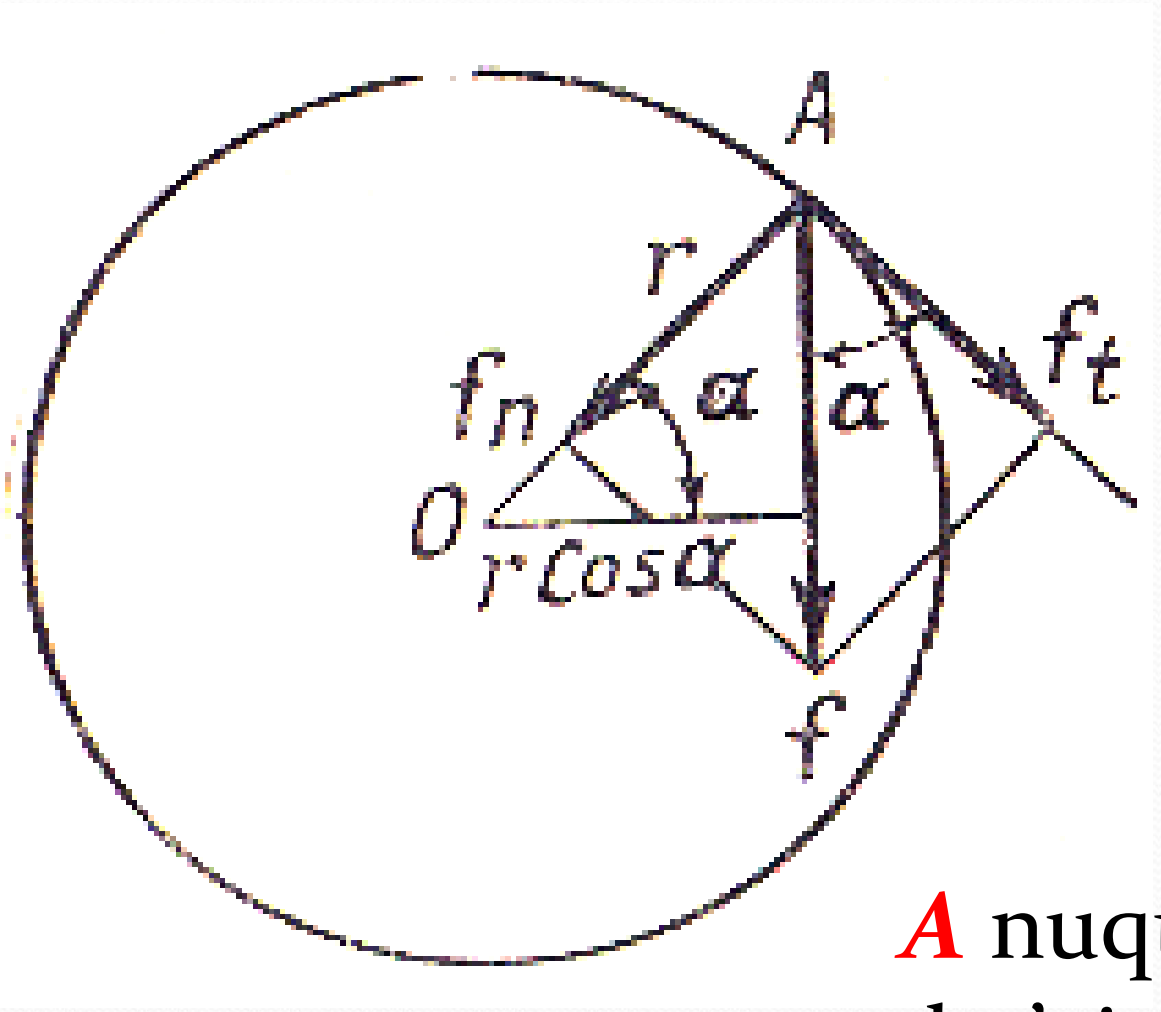
Nisbiy tezlikni aylanish o’qiga tik V_1 tashkil etuvchiga va o’q bo’yicha yo’nalgan V_2 tashkil etuvchiga ajratish.



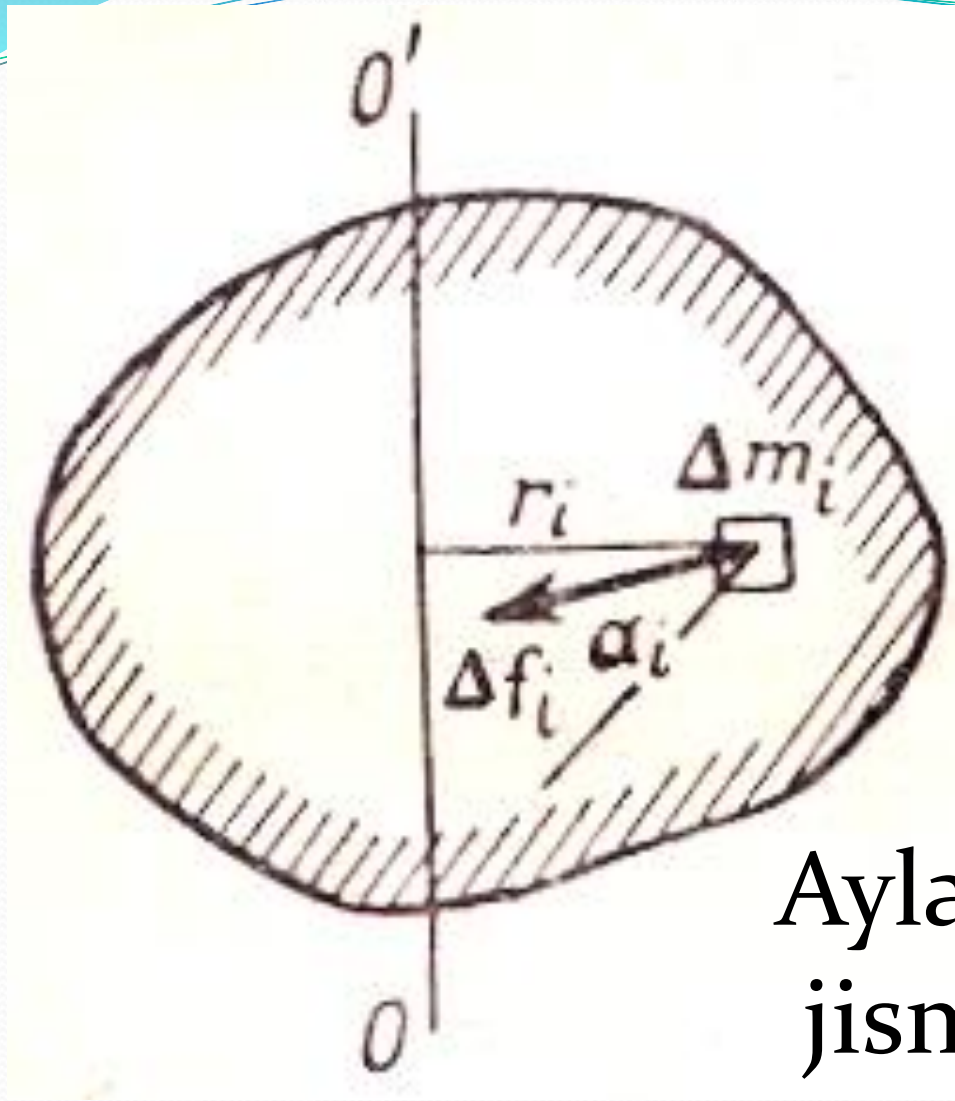
f_k Koriolis kuchining yo'nalishini aniqlash.



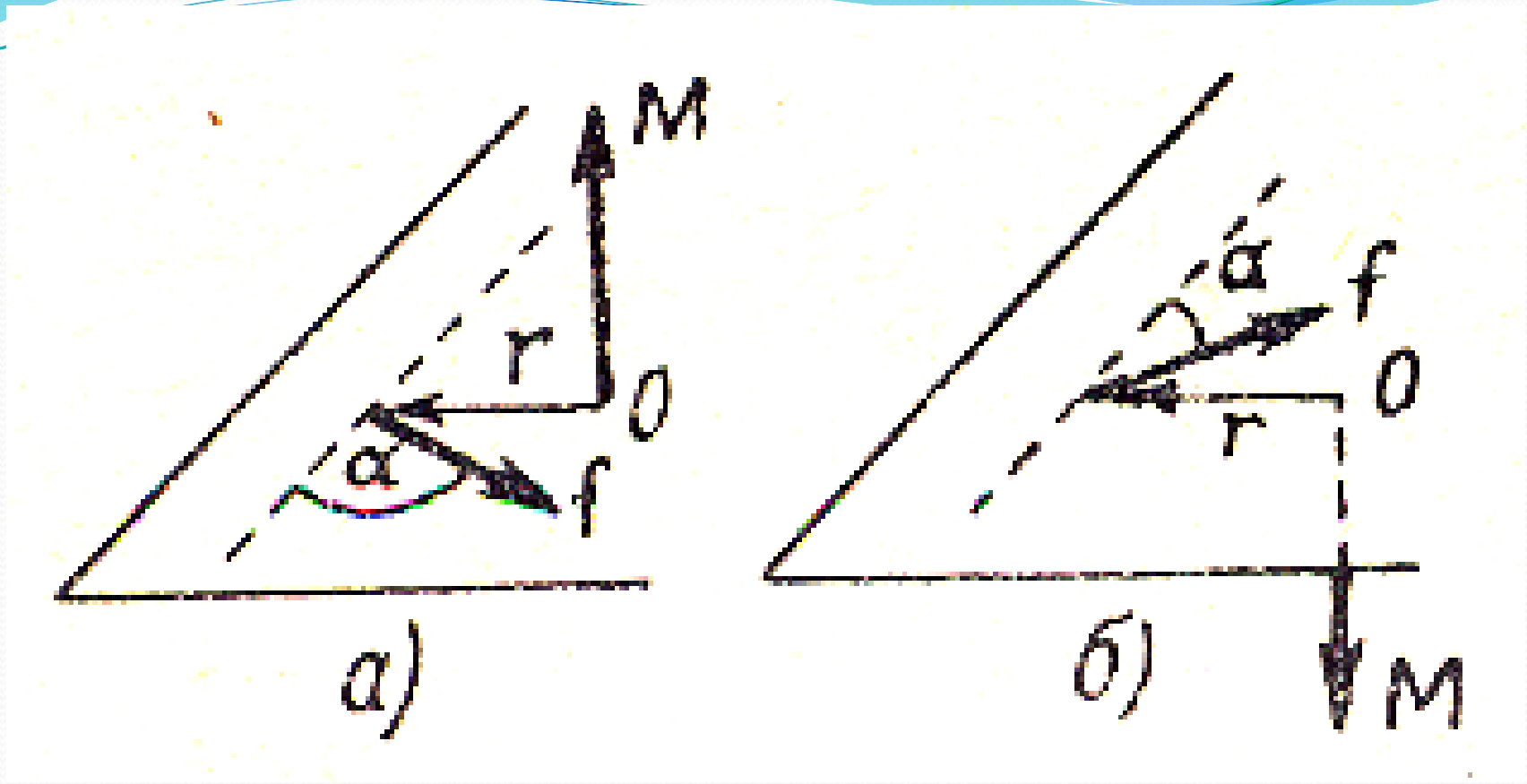
Yer sirtida harakatlanayotgan jismlarga ta’sir qilayotgan Koriolis kuchlarining yo’nalishi.



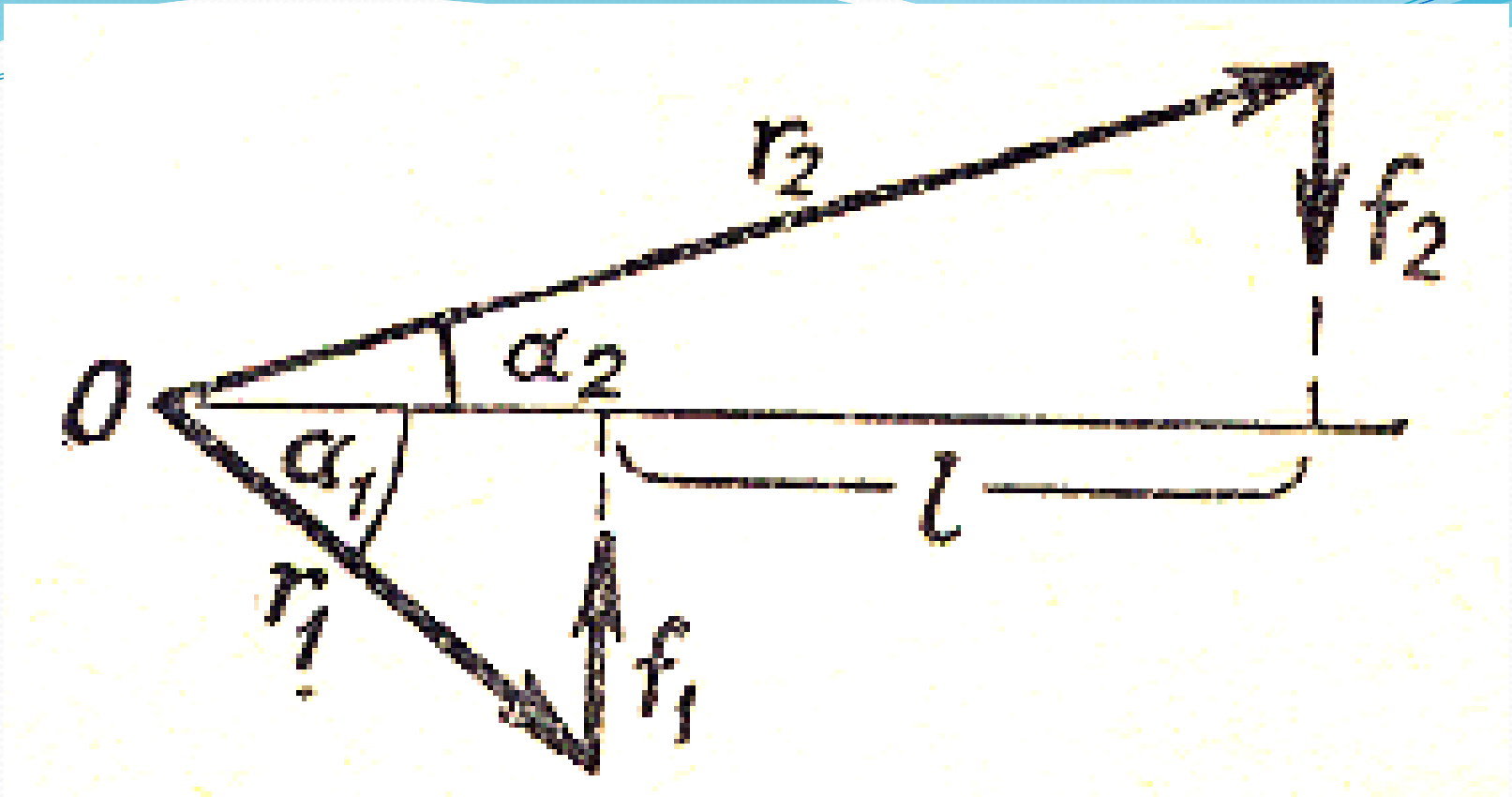
A nuqtaning aylana bo’yicha harakati.



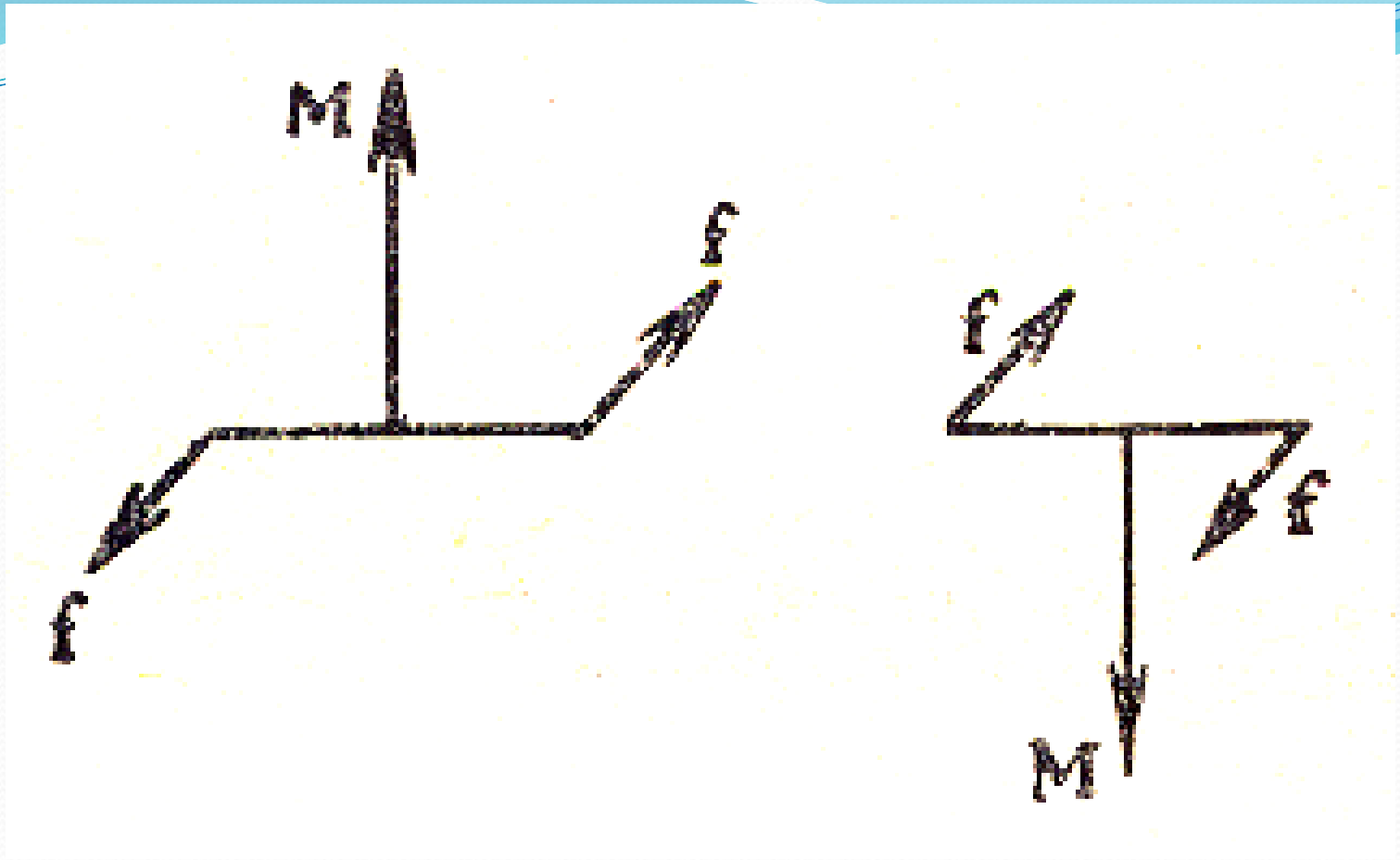
Aylanayotgan qattiq jismni juda mayda bo’laklarga ajratish.



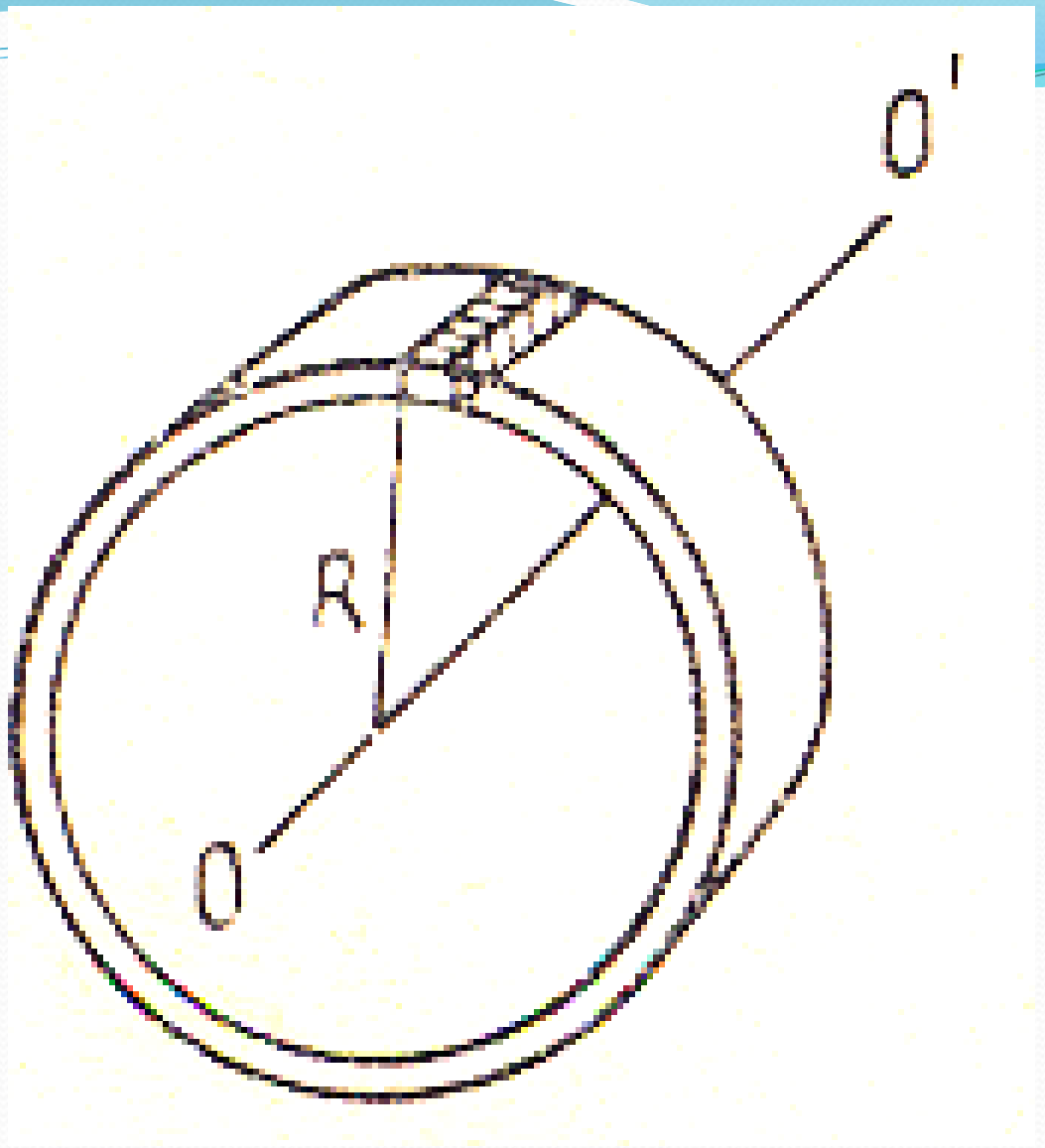
f kuchning ***O*** nuqtaga nisbatan momenti ***M*** vektor orqali ifodalanadi.



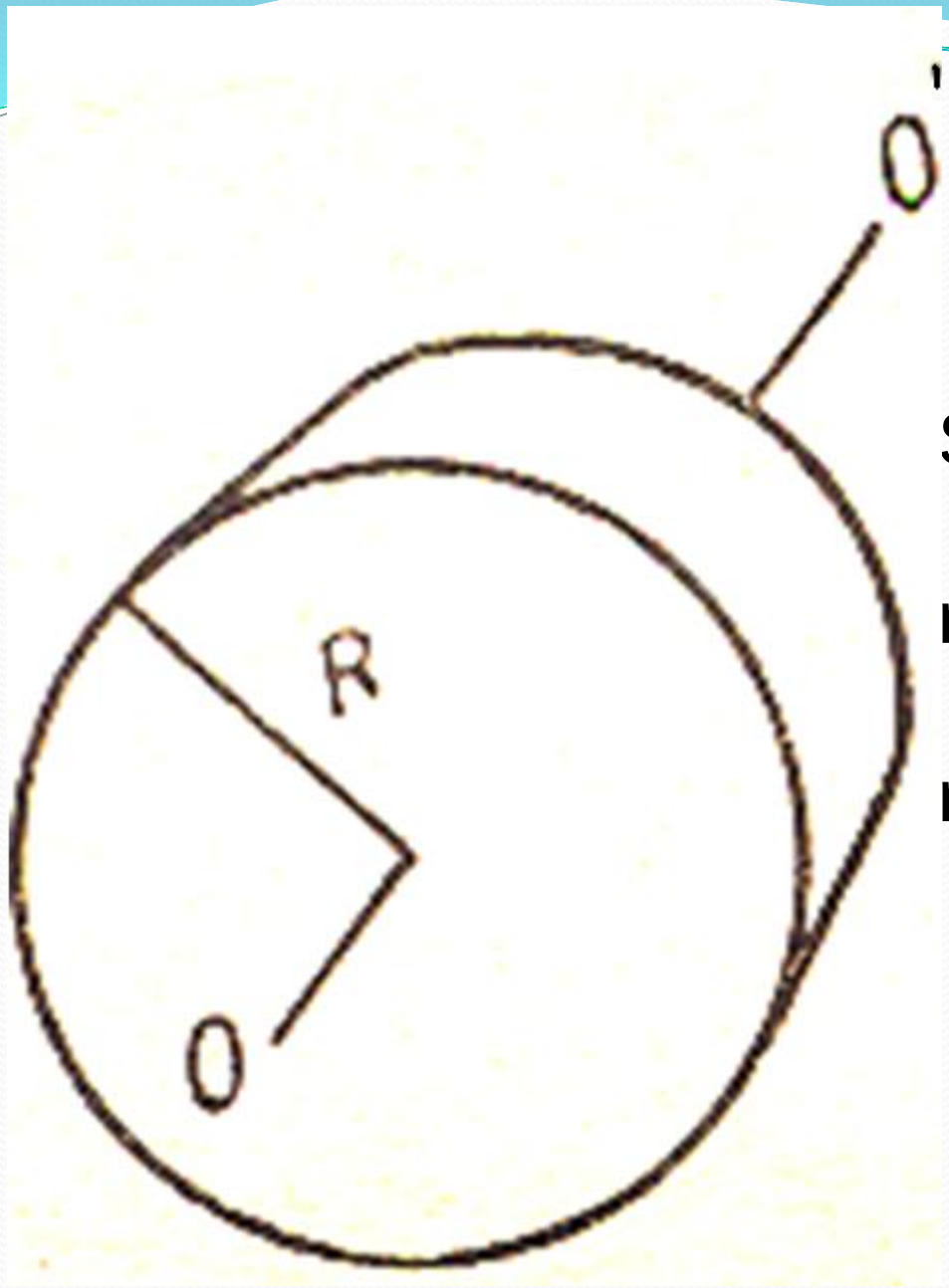
Juft kuchning ***O*** nuqtaga nisbatan momenti ***y*** nuqtaning o’rniga bog’liq emas.



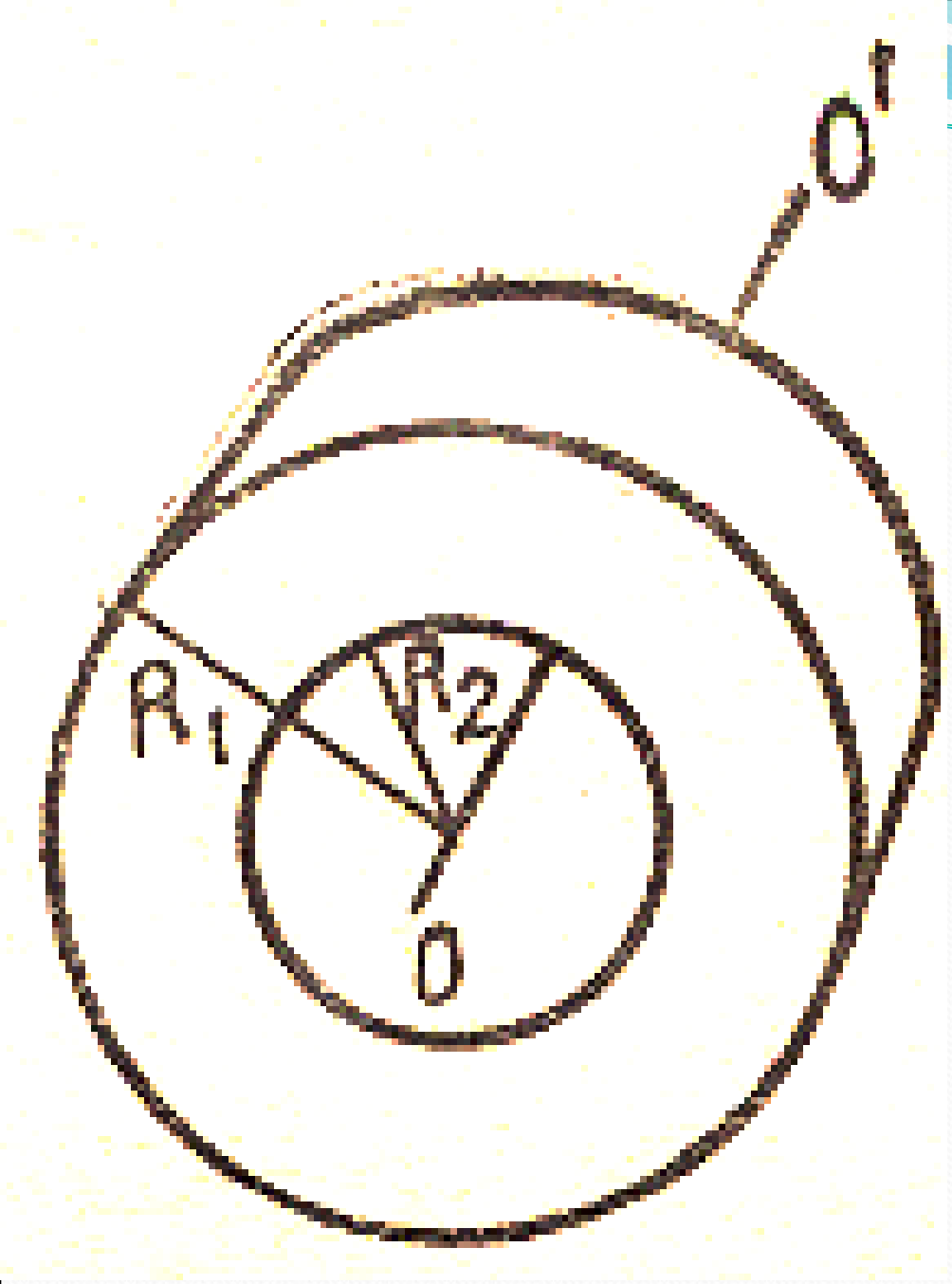
Juft kuchning momenti ***M*** vektor orqali ifodalanadi.



Kovak tsilindrning inertsiya momentini aniqlash.



Silindrning OO' o’qqa nisbatan inertsiya momenti $\frac{1}{2}mR^2$ ga teng.

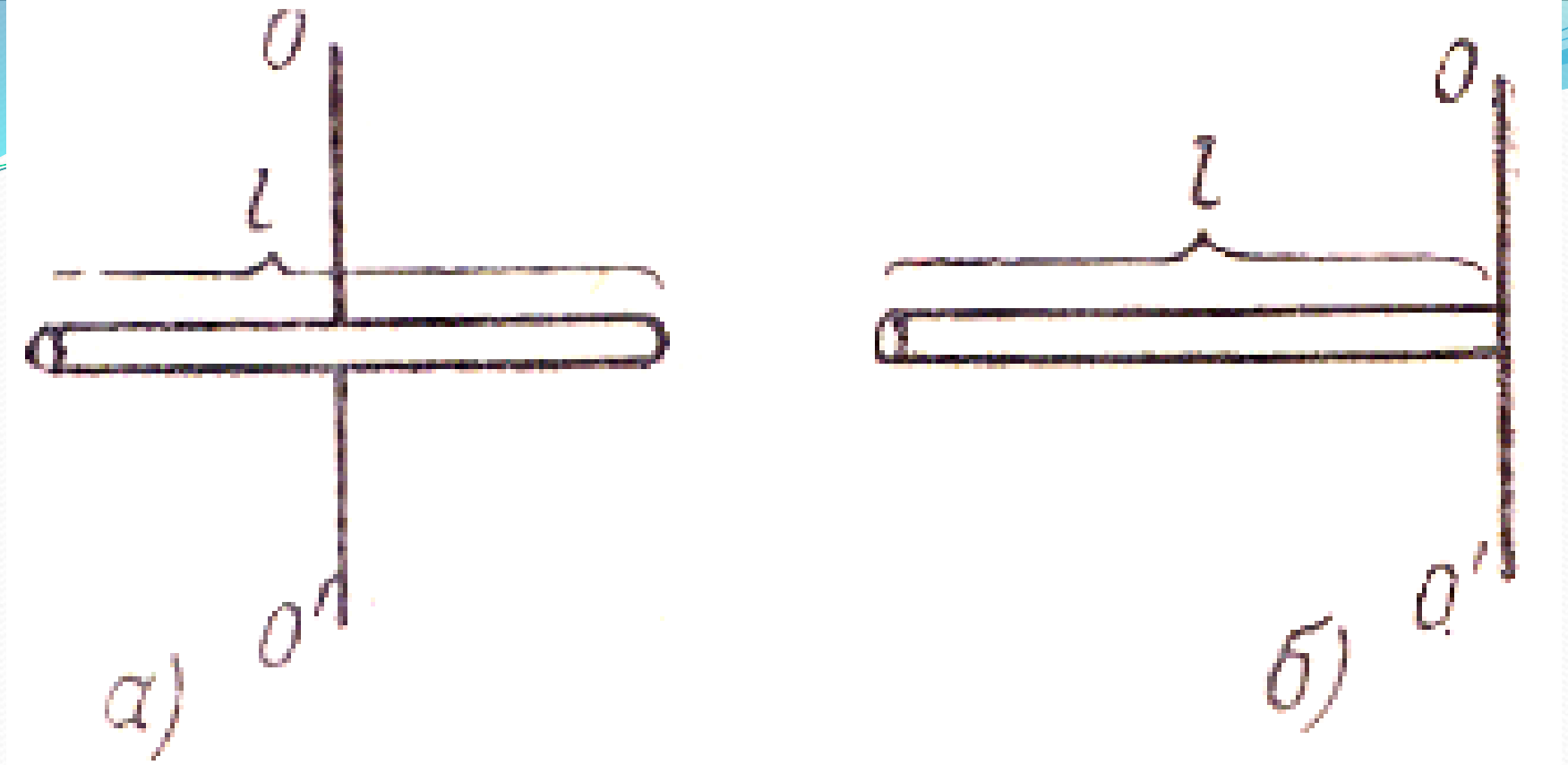


Kovak silindrning ***OO'***

o'qqa nisbatan inertsiya

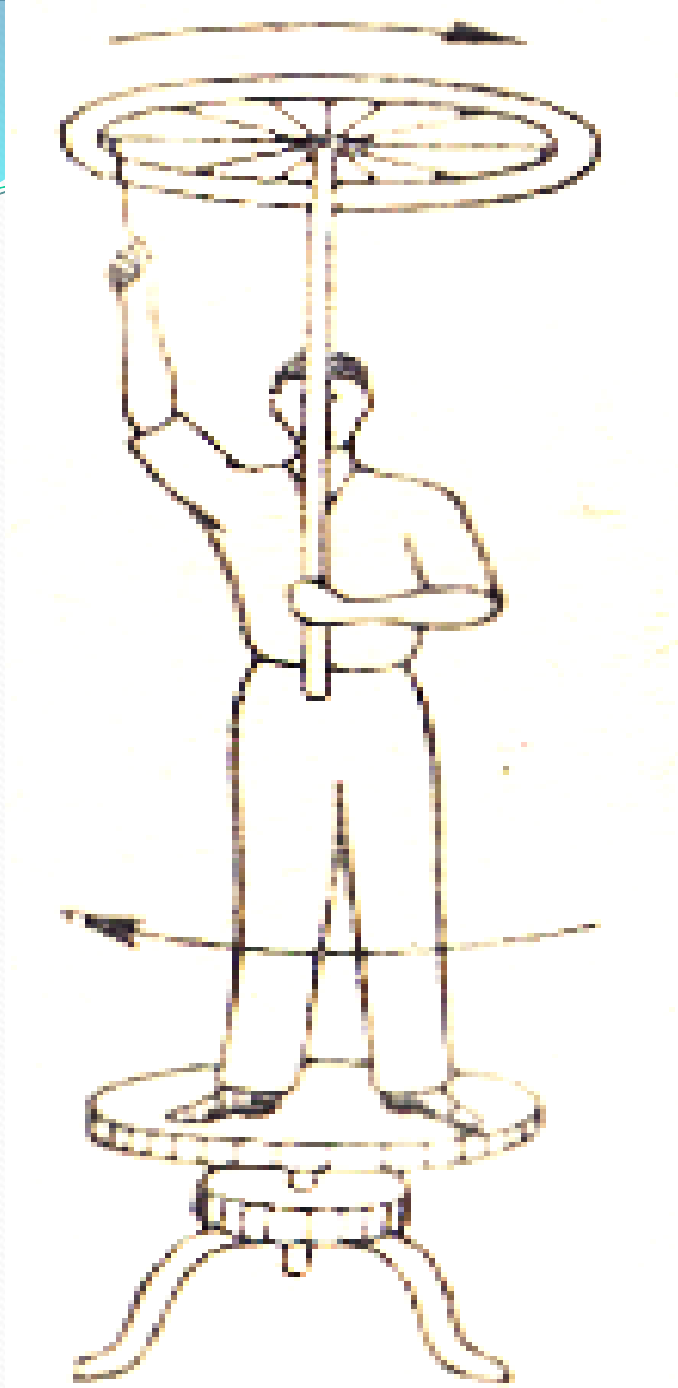
momenti

$\frac{1}{2}m(R_1^2 + R_2^2)$ ga teng.

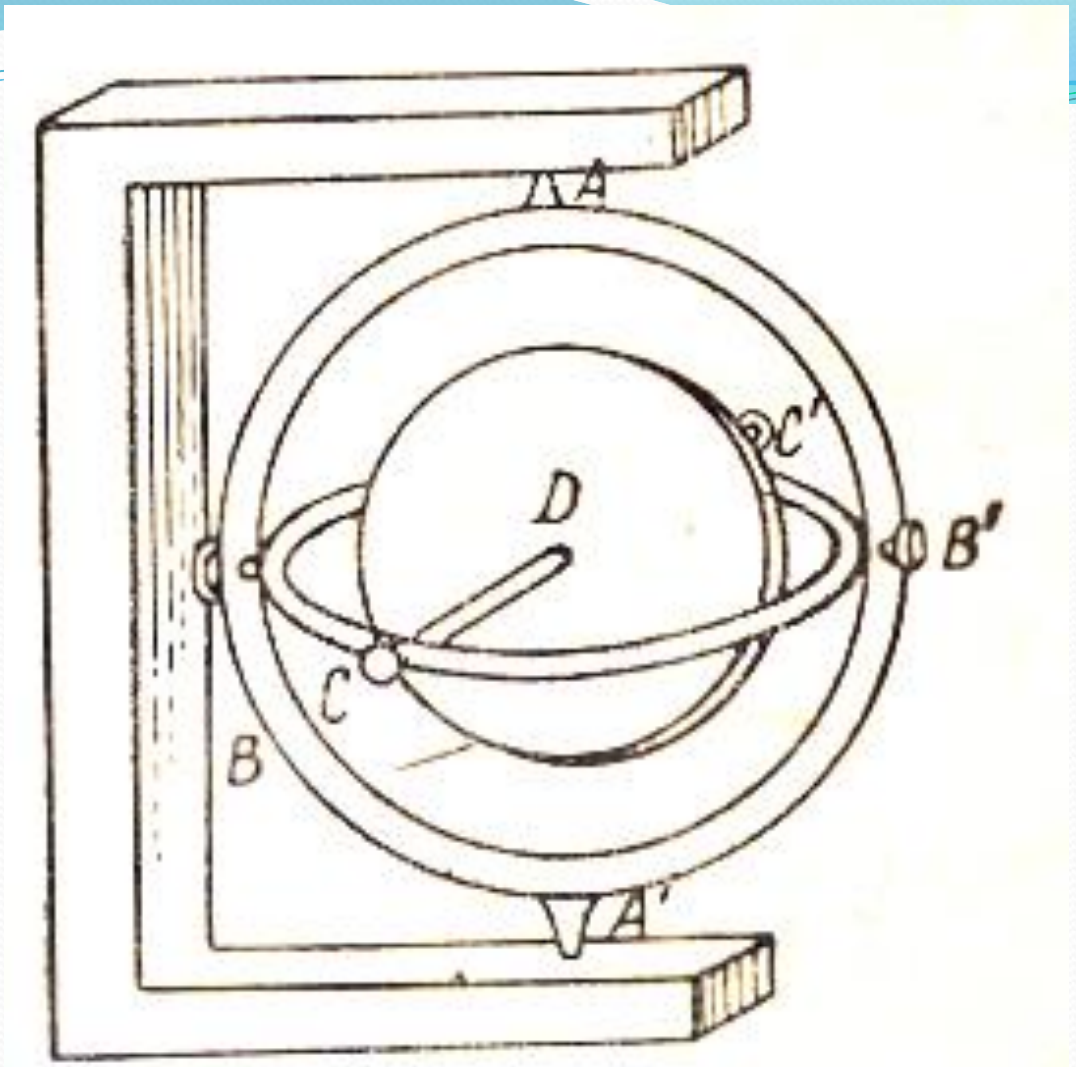


Sterjenning o’rtasidan o’tuvchi ***OO/*** o’qqa nisbatan inertsiya momenti $\frac{1}{12}ml^2$ ga teng, uning bir uchidan o’tuvchi o’qqa nisbatan inertsiya momenti $\frac{1}{3}ml^2$ ga teng.

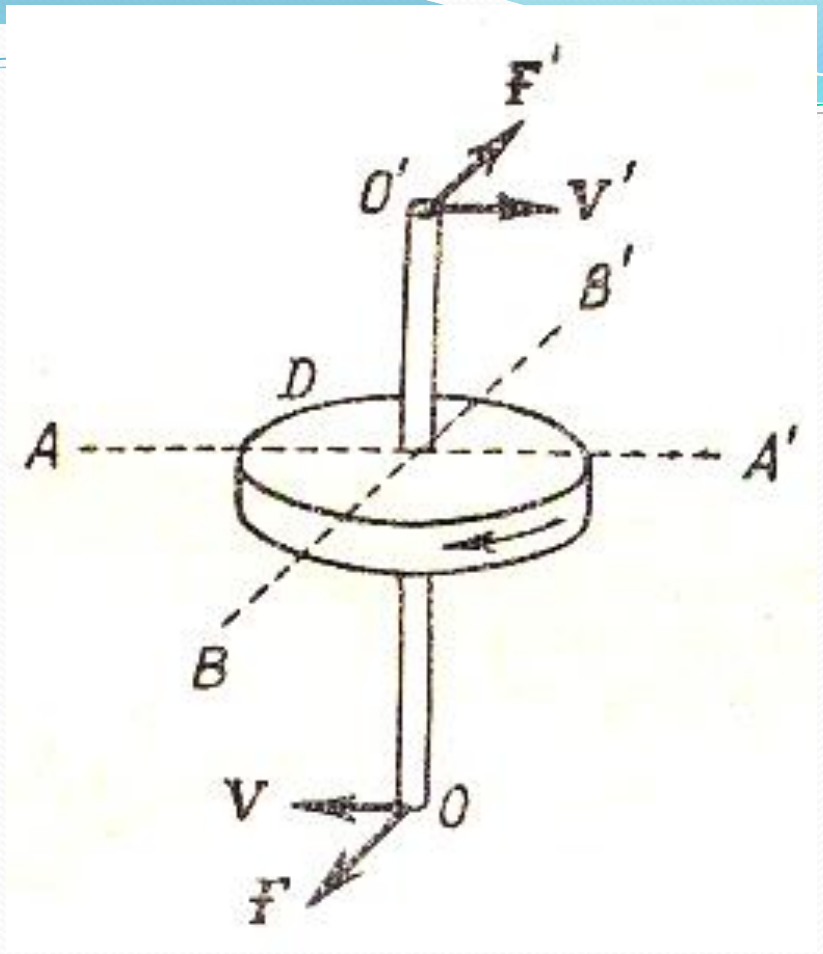
Kishi toshlarni ushlab turgan
qo’llarini pastga tushirsa,
u tezroq aylana boshlaydi.



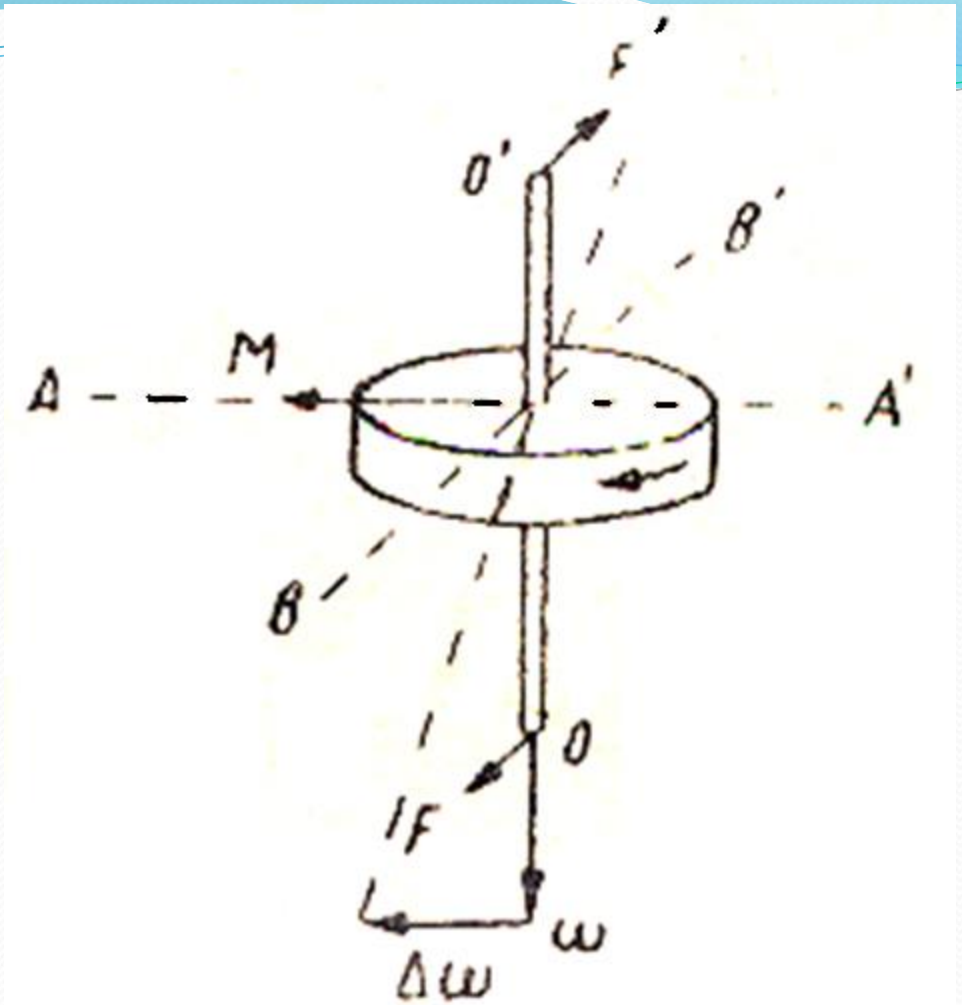
Kishi g’ildirakni aylantirsa, uning o’zi teskari tomonga aylana boshlaydi.



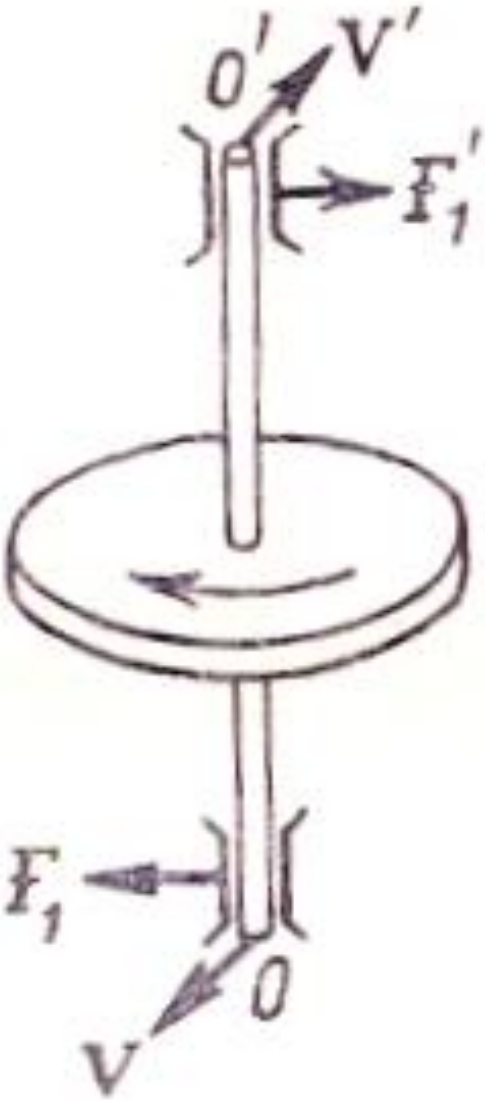
Kardan osmasidagi giroskop



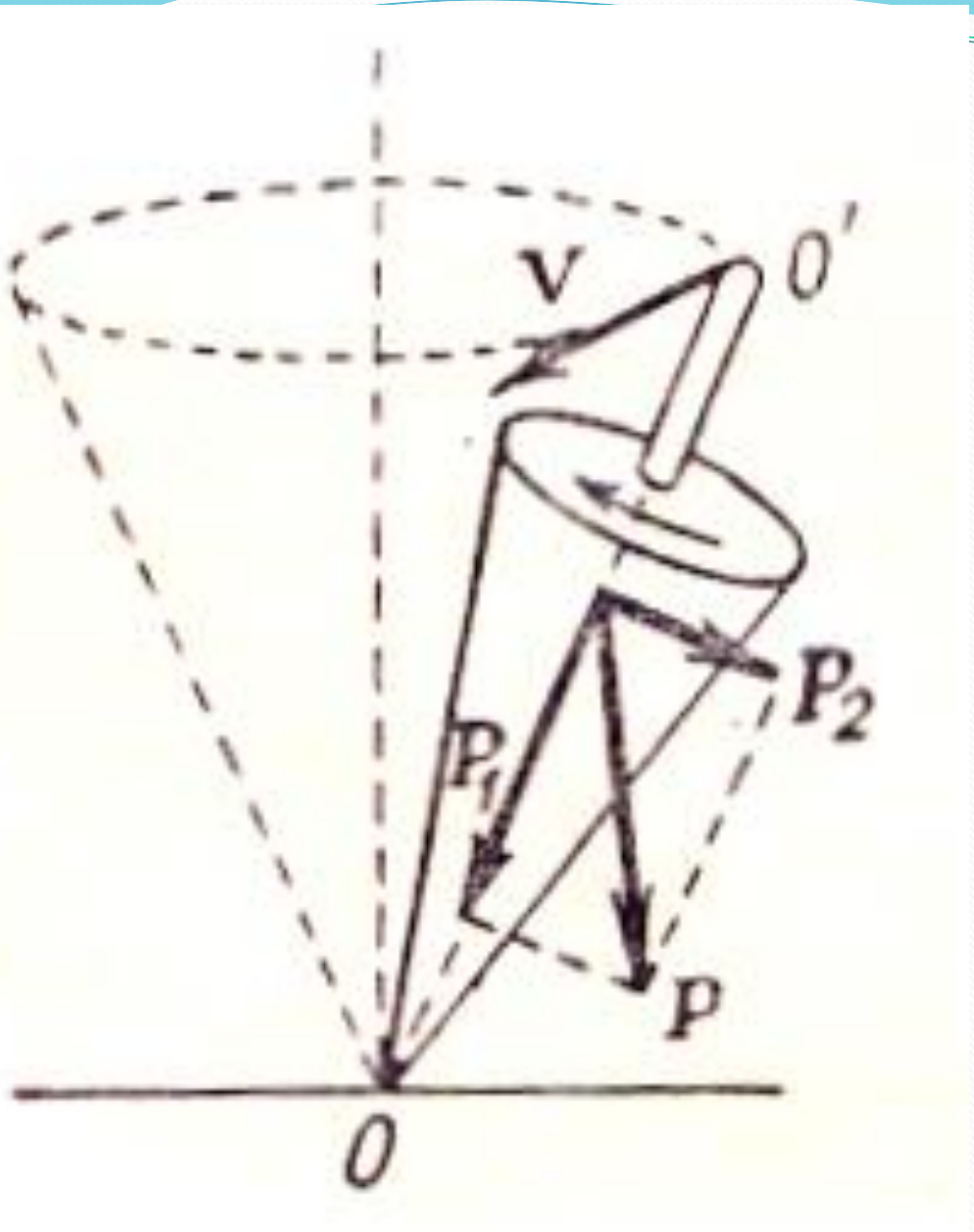
Giroskopning ***AA/*** o’q atrofida aylantirishga intiluvchi ***F*** va ***F/*** juft kuch mavjud bo’lganda giroskop ***AA/*** ga tik ***BB/*** o’q atrofida aylanadi.



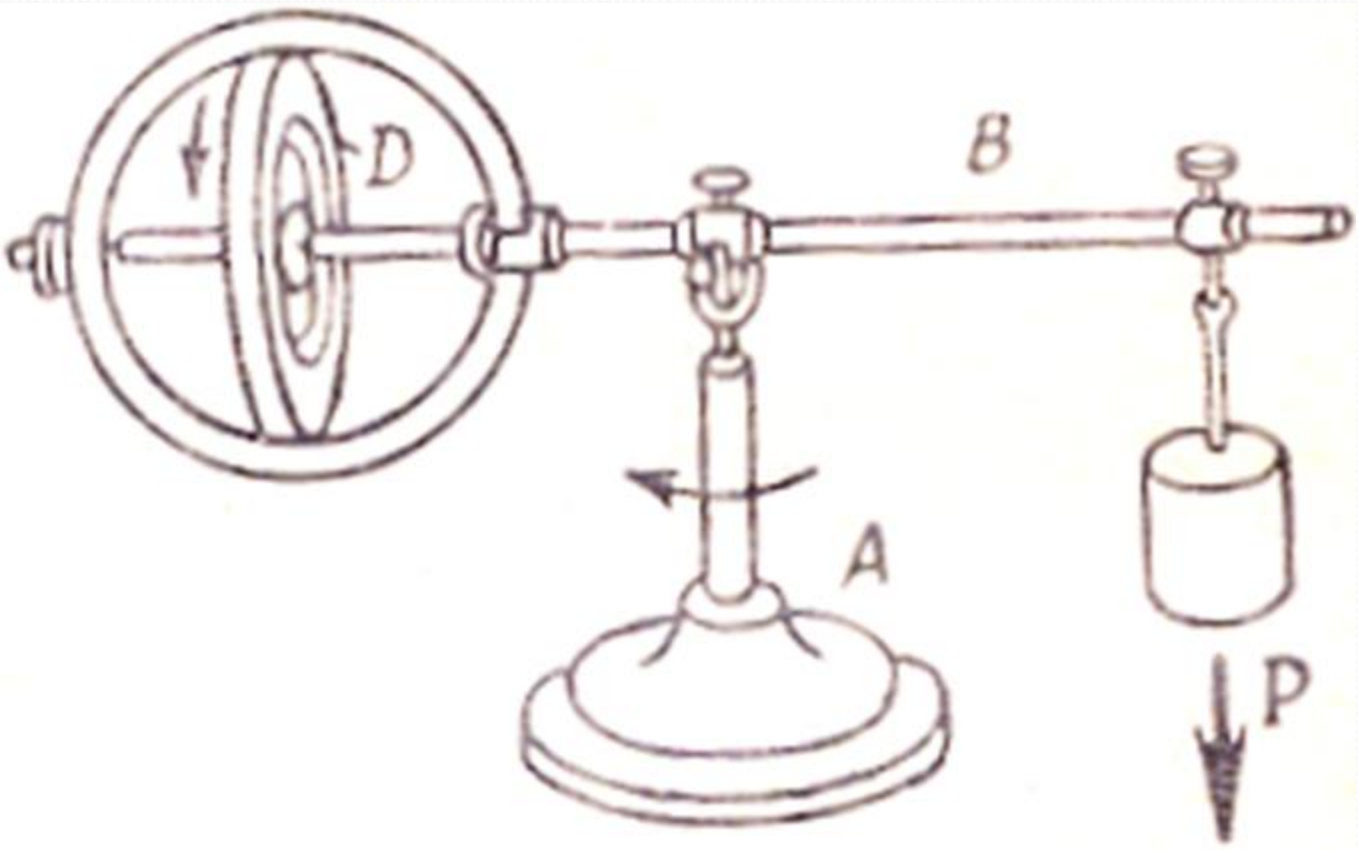
Giroskopik effektni tushuntirishga doir.



Giroskop o’qini ushlab turuvchi bog’lanishlarga ta’sir qilayotgan giroskopik F_1 va F'_1 kuchlar.



. Pildiroqning pretsessiyasi.



Richagli giroskop

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