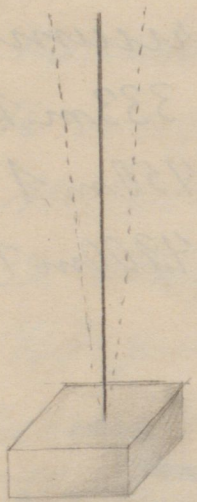
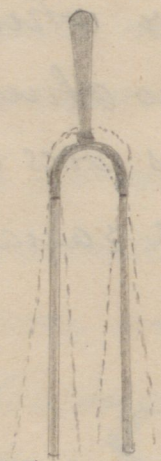
Hääl
Walgus
Magnetism
Elekter.

Ainu Kiin
V/a kl.

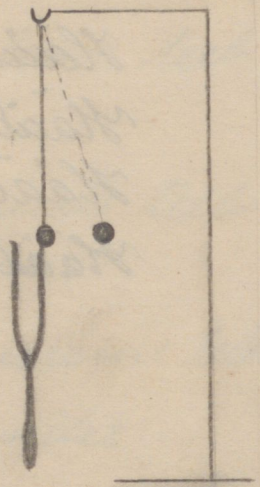
Hääl.



Suskavarda võnkumine



Kammertooni võnkumine

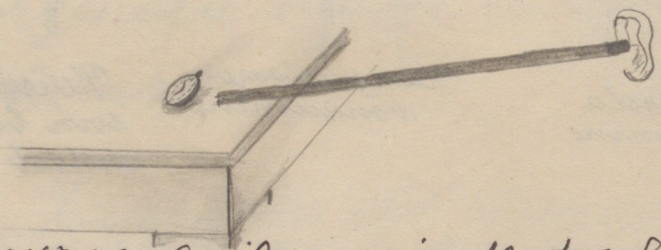


Helisev kammertoon tõukab endast õhuosakesi

Häällained

Hääle levimine

Hääl ei levi õhuta ruumis
Hääle kiirus õhus on 333 m. 1 s.
Hääle kiirus vees on 1450 m 1 s.
Hääle kiirus rauas on 4900 m 1 s.

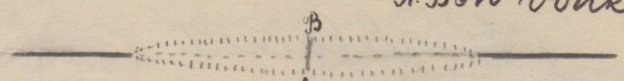


Hääl levib ka kindlat keha mööda

Hääle tugevus ja kõrgus

Hääle tugevus oleneb võnkumise ulatusest

A. Bon võnke ulatus



Võnkuv keel

Hääle kõrgus oleneb võnkete sagedusest
(tihedusest)

Madalaim toon mida kuuleme teeb
16 võnget sekundis.
Madalaim toon muusikas teeb
32 võnget sekundis
Kõrgeim toon, mida kuuleme teeb
kuni 40000 võnget sekundis.
Kõrgeim toon muusikas teeb
kuni 4000 võnget sekundis.
Inimese hääle võnkete arv (sa-
gedus) on 80-1300.
Põhitooniks ehk põhiheliks on
võetud A mida annab kam-
mertoon ehk helihark.
Kammertoon teeb sekundis 435
võnget. Tema lainepikkus on

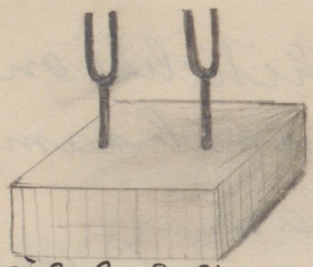
$$\frac{333}{435} = 0{,}7655\,m = 76{,}6\,cm$$

Ülesanne: Helisev kahe tuli 68 võnget sekundis. Kui suur on häälelainete pikkus?

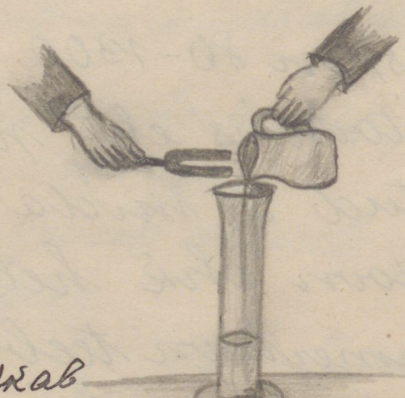
$$\frac{333}{68} \approx 4{,}8\,m$$

Kõrgemate helide lained on lühemad.

Kaasköla ehk resonants.



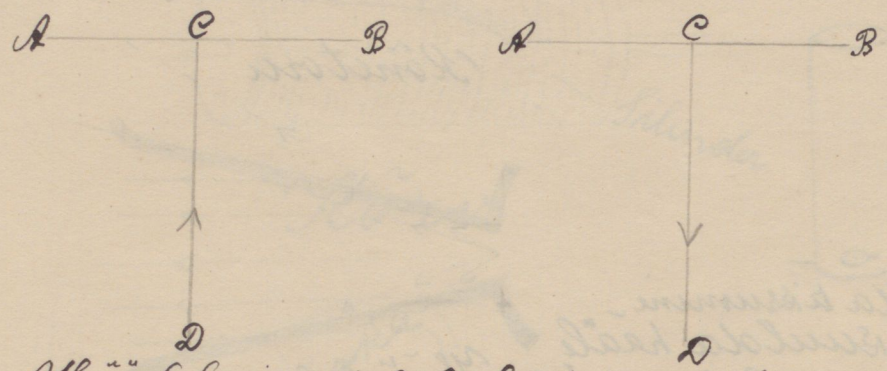
Ühele helisevale helihargile kaskab teine kaasa helisema.



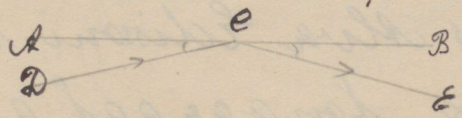
Teatud veesamba kõrgusel kaskab õhusammas kammertoonile kaasa helisema

A. Kiin

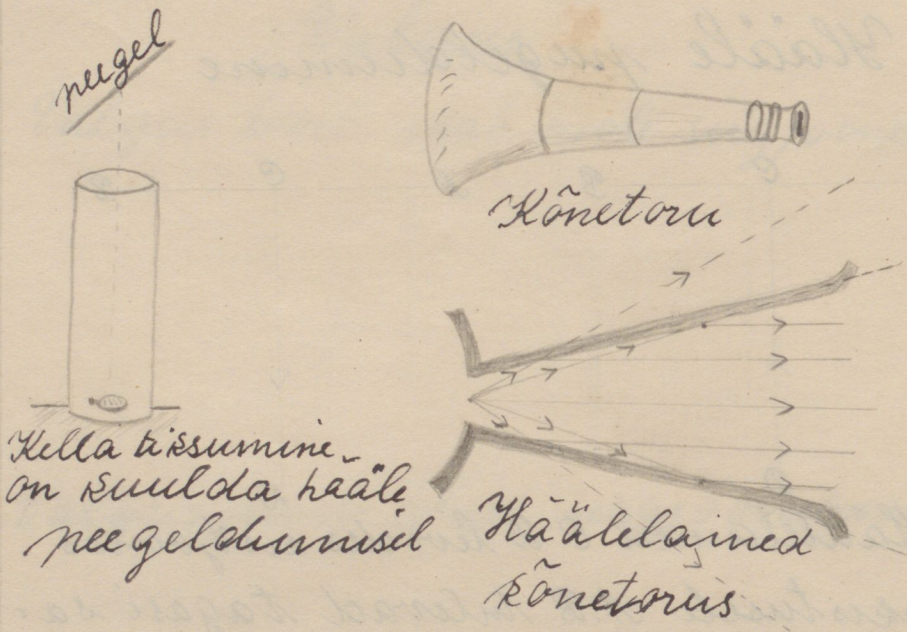
Ääle pegeldumine



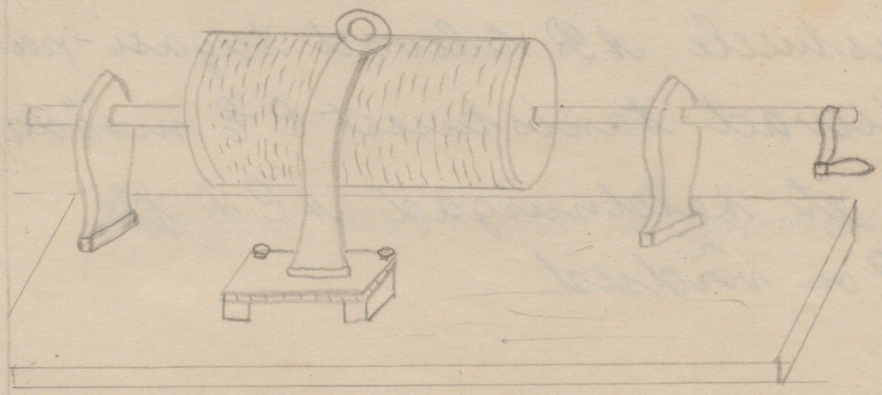
Häälelained C D levides ristjoones takistusele A.B tulevad tagasi samajoont mööda vastupidises sihis



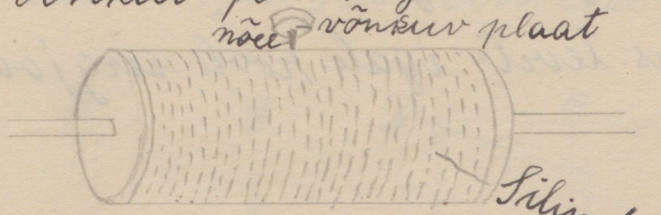
Häälelained levides DC mööda takistusele AB tulevad tagasi-pegeldavad-takistusest CE mööda, nii et kaldnurgad ACD ja BCE on võrdsed.



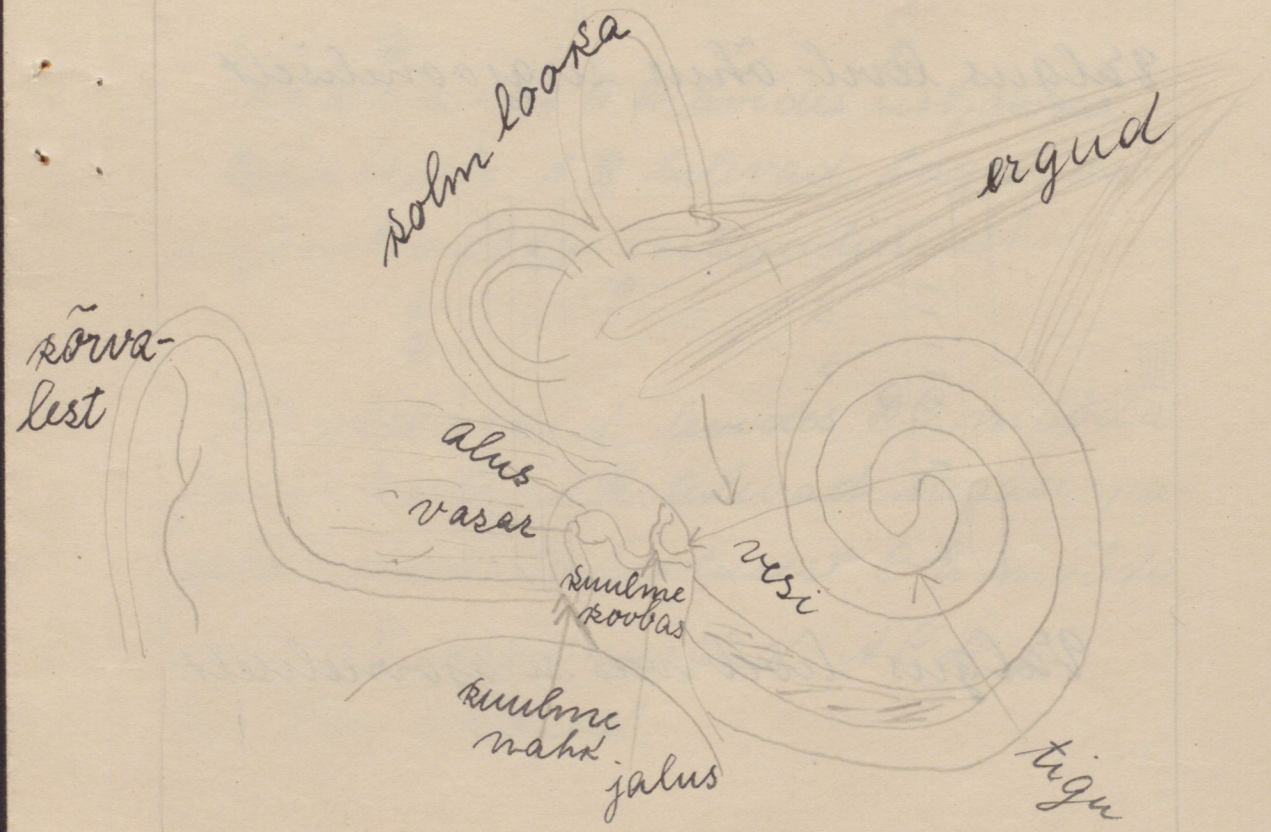
Thomas Alva Edisoni tähtsam leiutis, fonograaf, a. 1875



Fonograafi silinder,
võnkuv plaat ja nõel

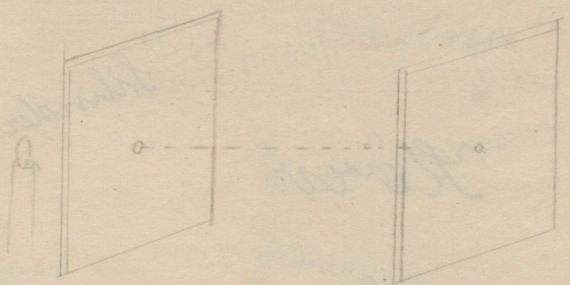


Kõrv.

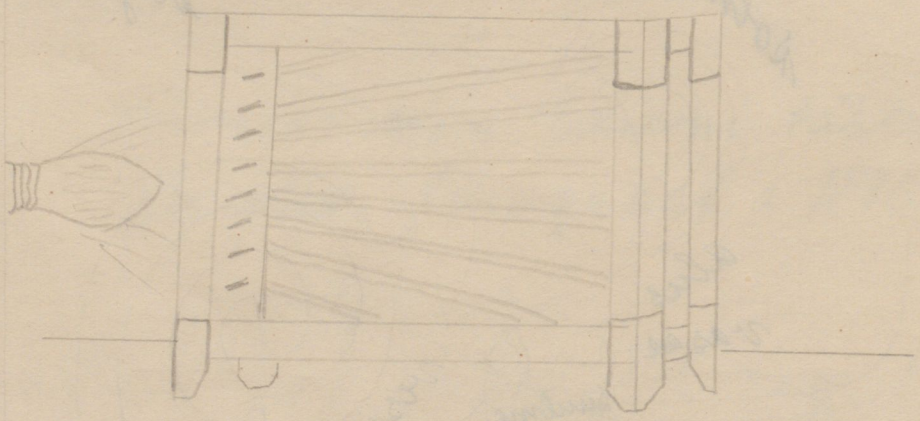


Valgus.

Valgus levib igale poole sirgjooneliselt.

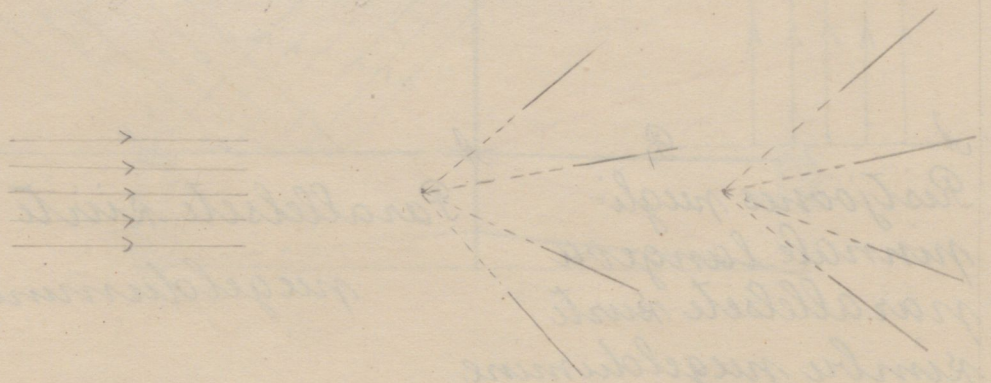


Valgus levib õhus sirgjooneliselt

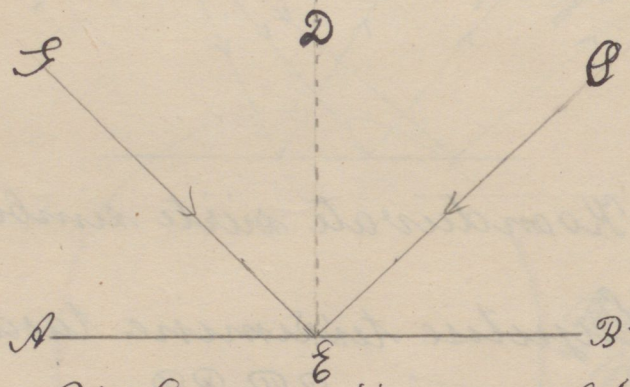


Valgus levib vees sirgjooneliselt

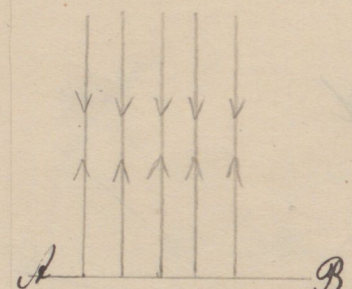
Kiirte sirnbud



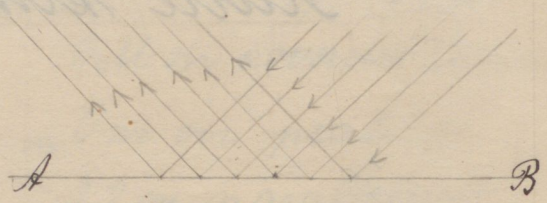
Valguse peegeldumine tasapeeglis.



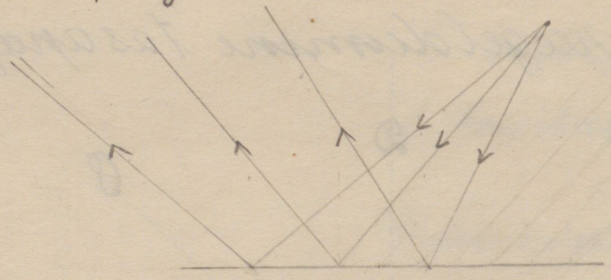
Valguse sirre peegeldumine
CE on langev sir
SE on peegeldunud sir
$\angle CED$ on langemisnurk
$\angle DES$ on peegeldumisnurk



Ristjoones peegli-
pinnale langeva
paralleelsete kiirte
kimbu peegeldumine.



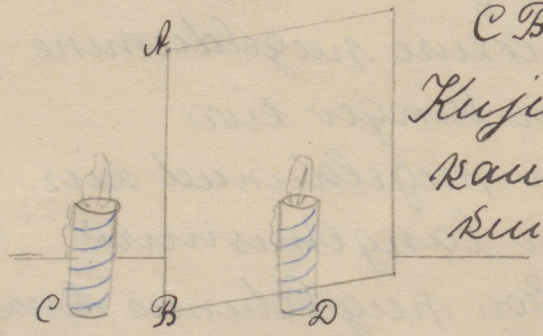
Paralleelsete kiirte
peegeldumine



Koonduvate kiirte kimbud

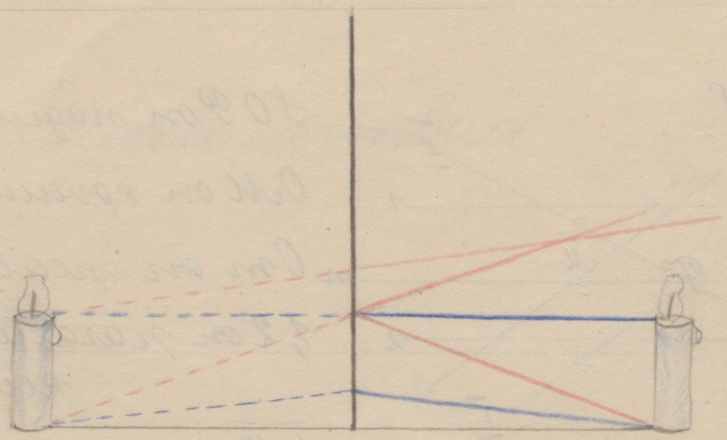
Kujutise tekkimine tasapeeglis.

CB=BD

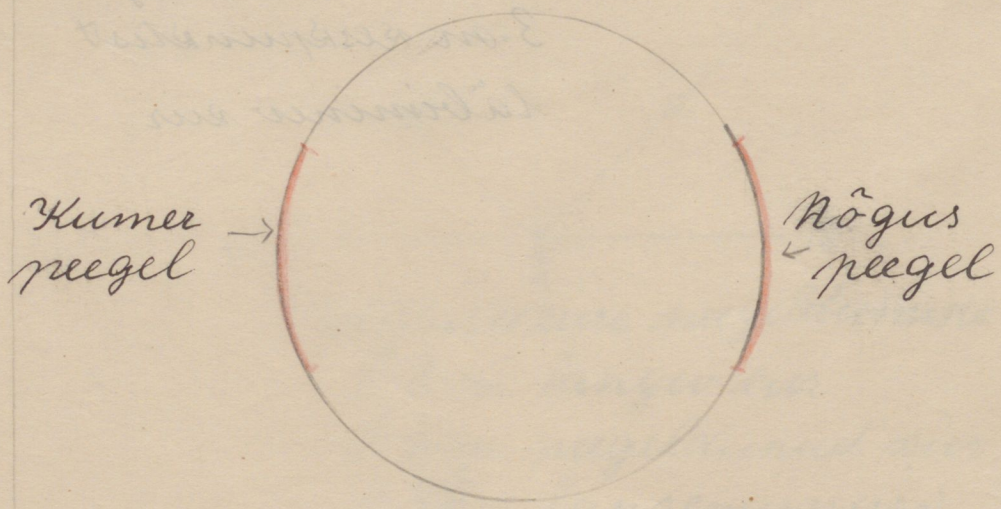


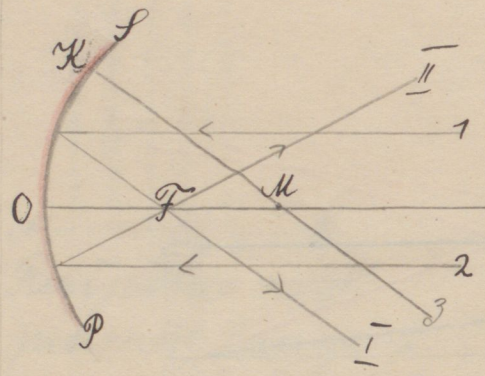
Kujutis asjast on sama
kaugel peegli taga
kui asi peegli ees.

A. Kiin.



Kerapinnalised peeglid.





SOP on nõgus peegel

OM on kõverus raadius

Om on peateljg

1, 2 on paralleelsed kiired

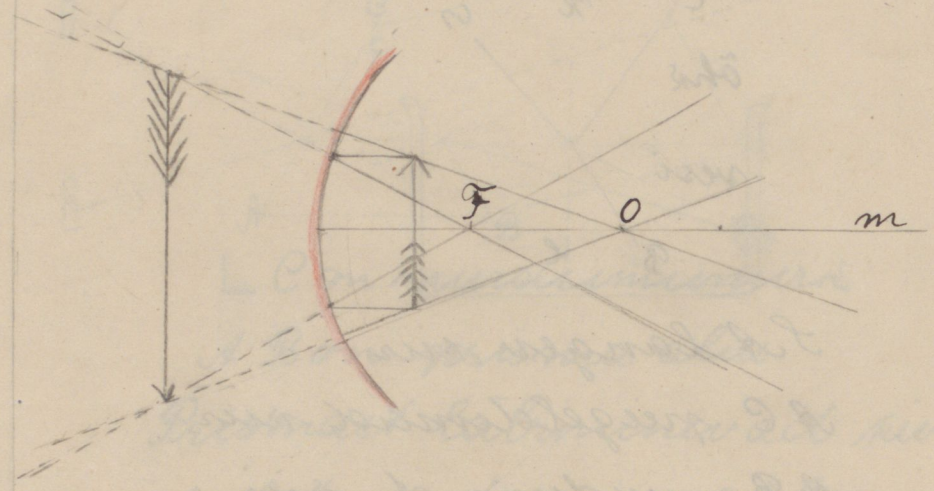
I, II on peegeldunud kiired

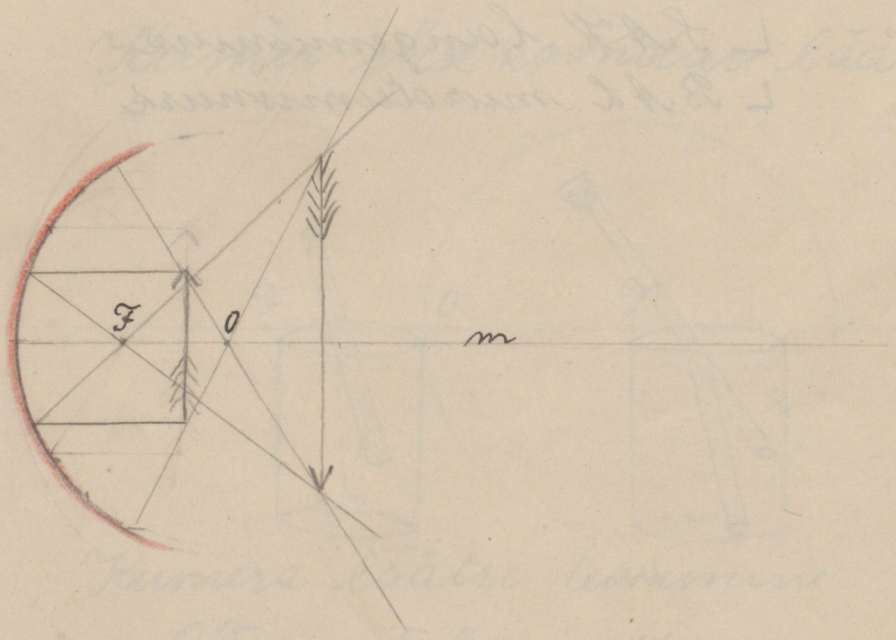
F tulipunkt

OF on tulipunkti kaugus

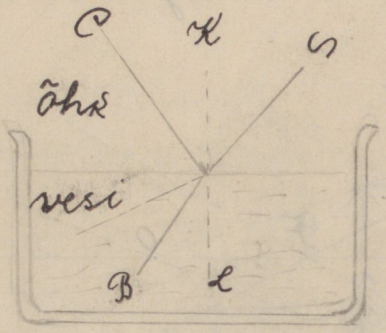
3 on läbiminev kiir

Asjade kujutis nõgus as peeglis





Valguse murdumine



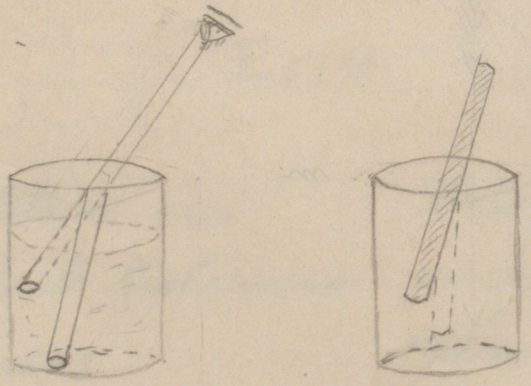
$\angle$ A langev kiir

A C peegeldumud kiir

A B murdunud kiir

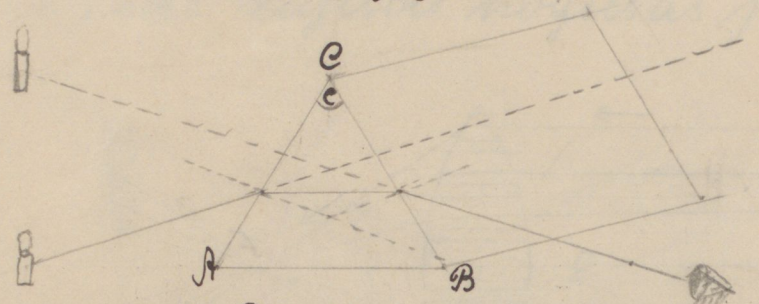
$\angle$ SAK langemisnurk

$\angle$ BAL murdumisnurk



A. Kiin

Prisma



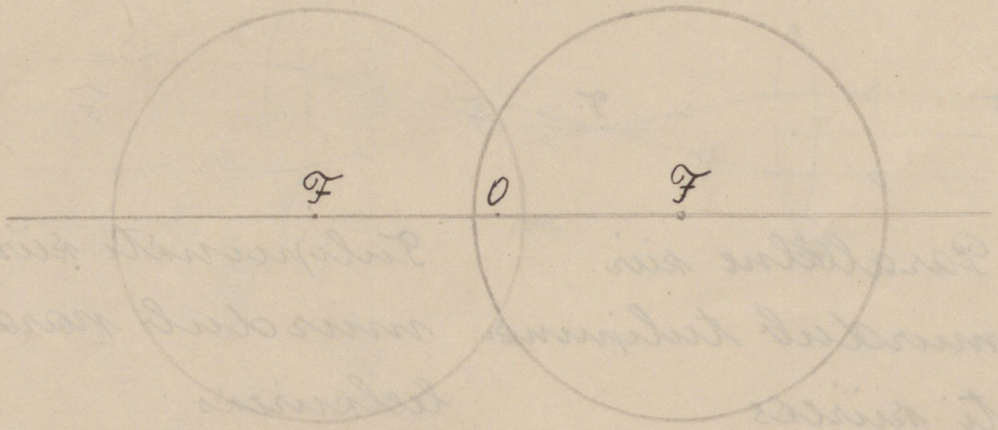
∠ C on murdumisnurk

A B on prisma alus

Prismast läbiminevad kiired

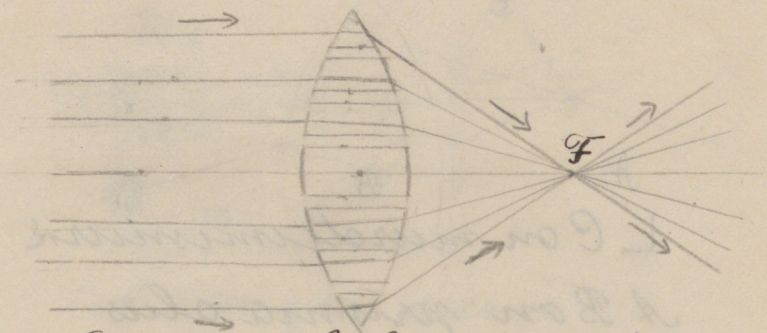
kalduvad prisma aluse poole

Kumer ehk koondav lääts



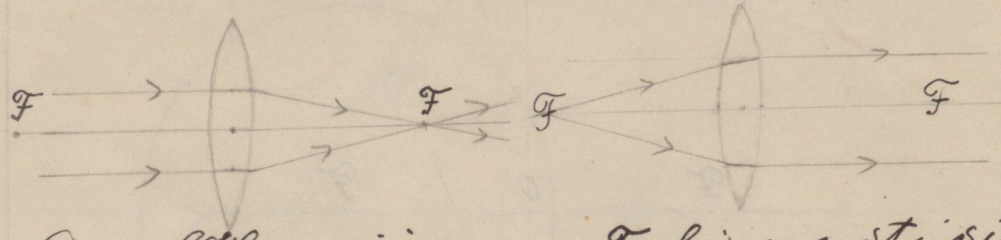
Kumera läätse tekkimine

O F on tulipunkti kaugus



Läätse võib vaadelda kui hulgast prismadest koosneis-vad seha.

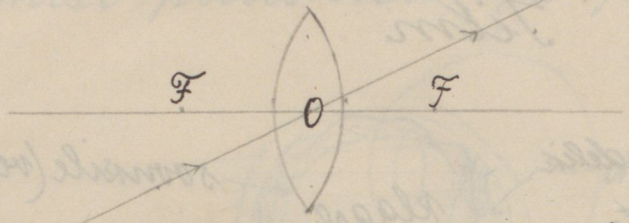
Kiirte murdumine



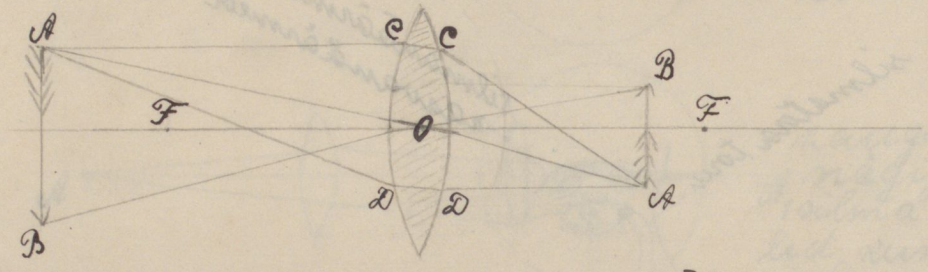
Paralleelne kiir murdub tulipunkti kiirtes

Tulipunkti kiir murdub paralleelkiirtes

A. Klein

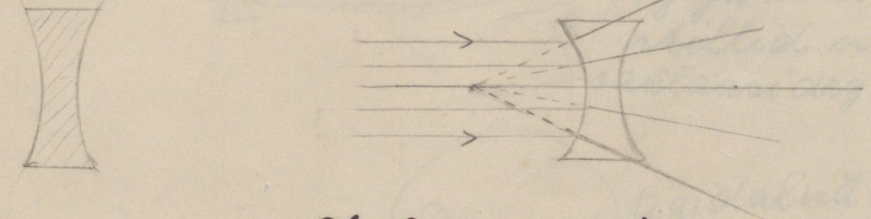


Teaksiir ei murdu



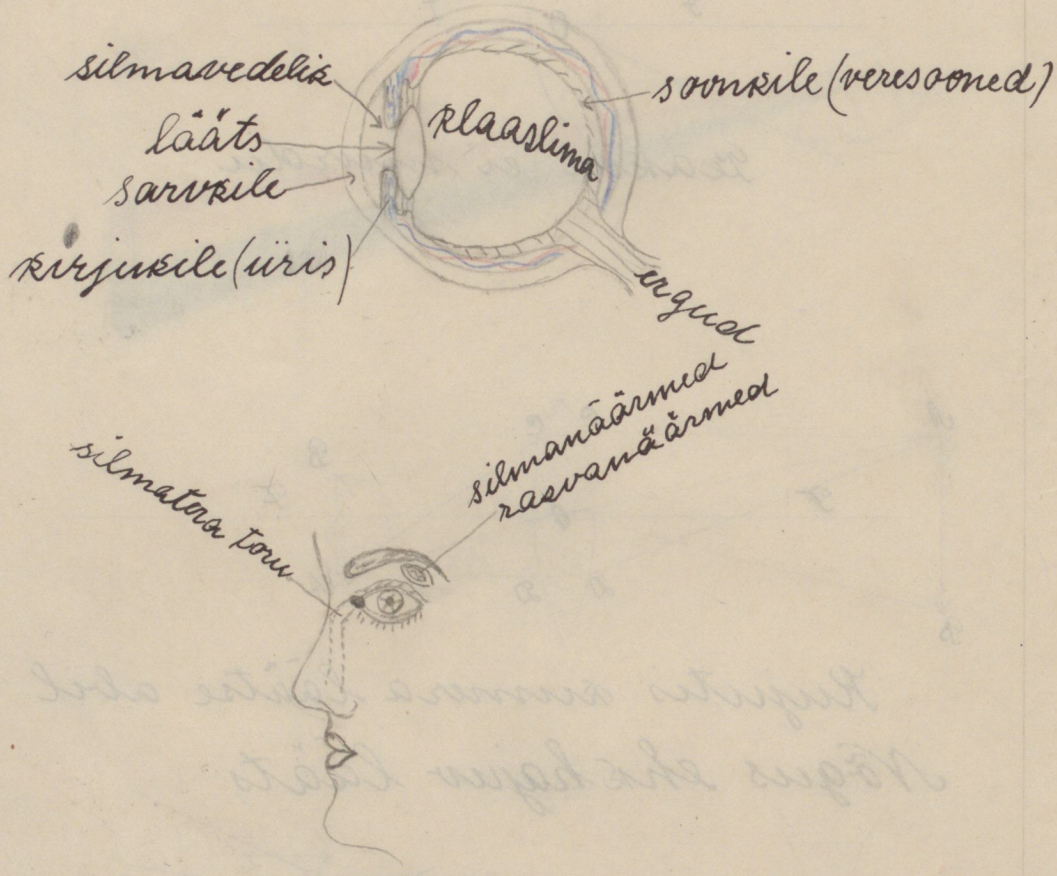
Kujutis kumera läätse abil

Nõgus ehk hajuv läätse

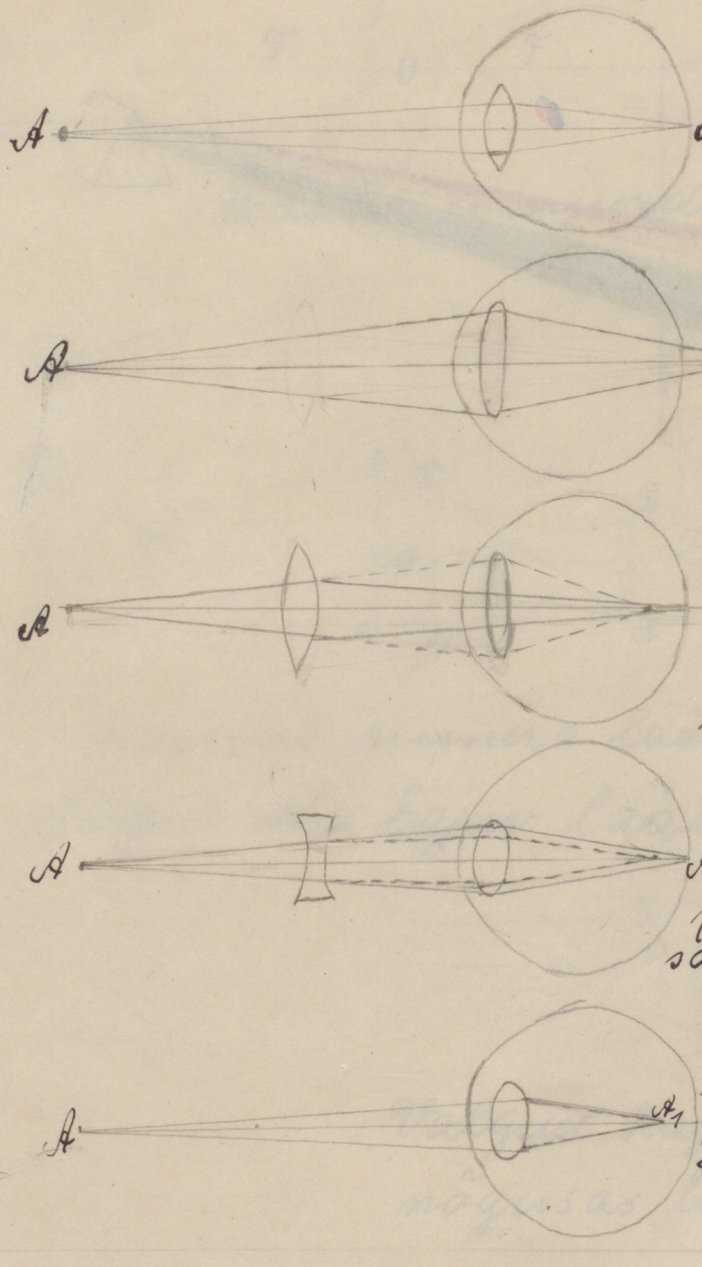


Valguse hajumine
nõgusas läätses

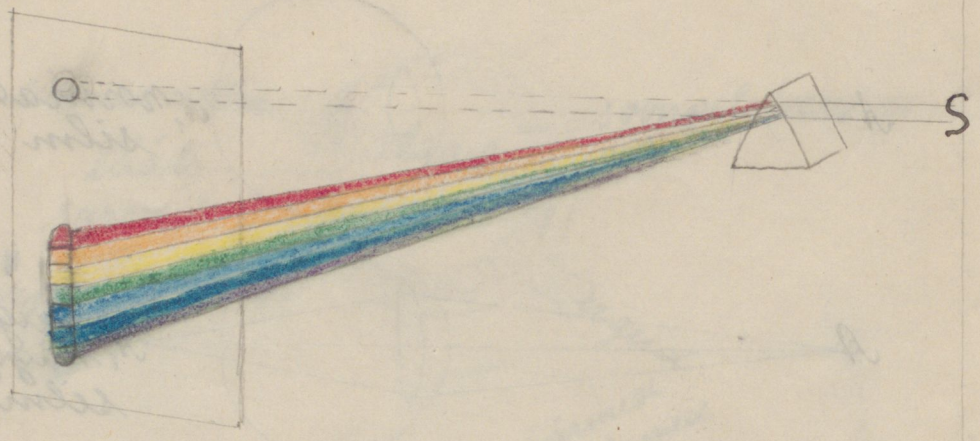
Silm

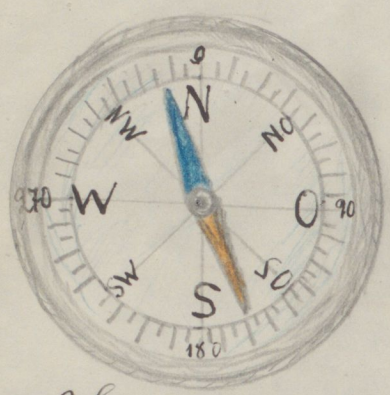

silmavedelik
lääts
sarvkile
kirjukile (üris)
klaaslima
soonkile (veresooned)
võrkkest
silmanäärmed
rasvanäärmed
silmatera toru

Nägemise puudused ja prillid

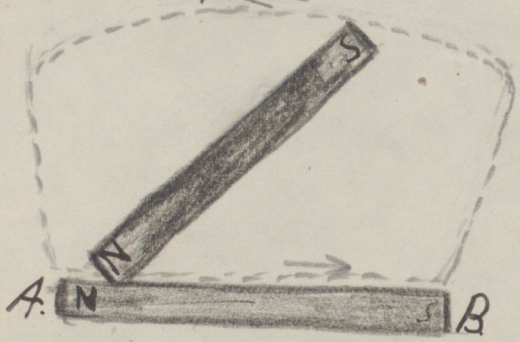


Valguse hajumine



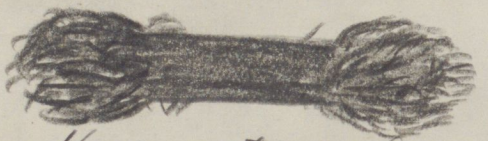


Kompass.

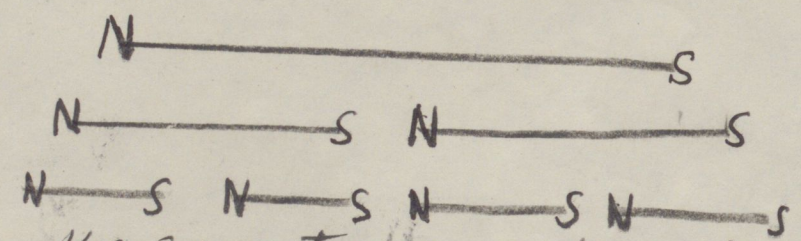


Magnetimine

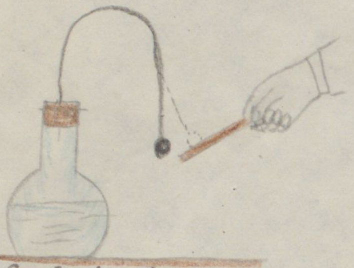
Magnet.



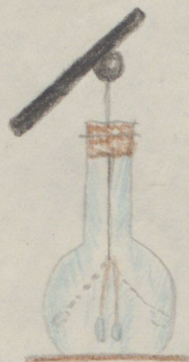
Magneeti jaotused



Magneeti poolitamine

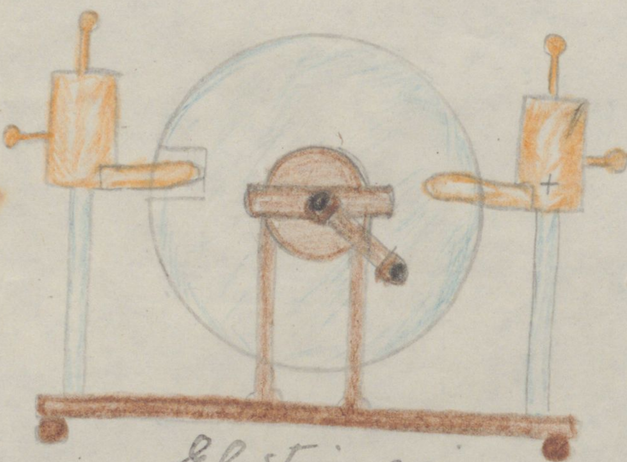


Elektri edasi an-
dmine puutumisel.

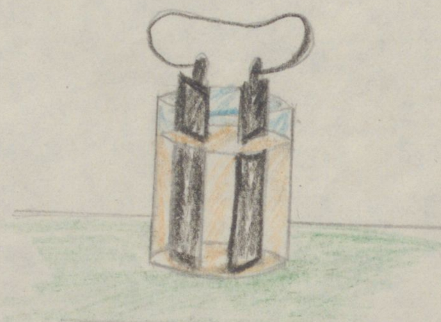


Lihtne elekt-
roskoop.

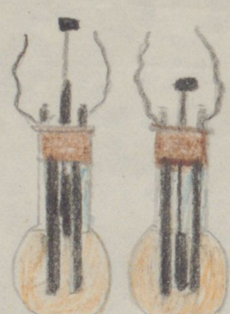
Elektrituul



Elektrimasin

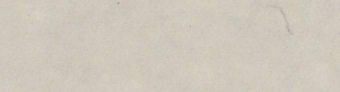


Volta element

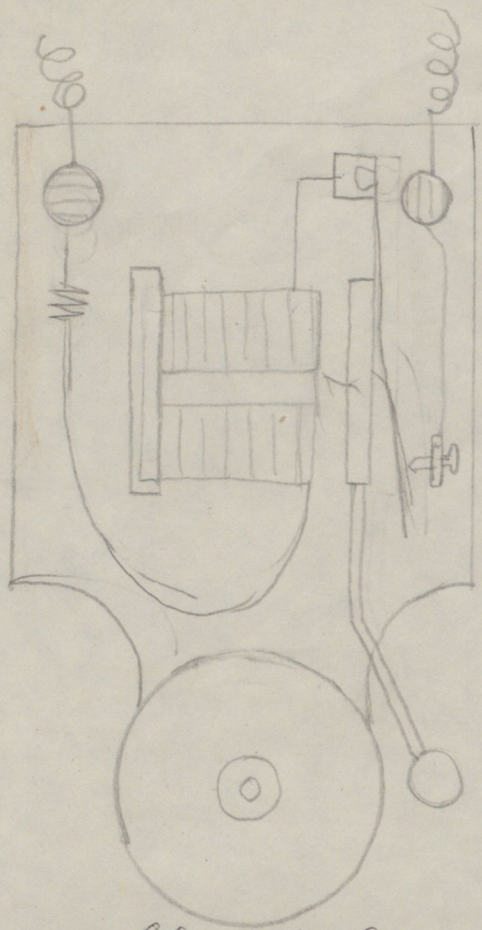


Grenet' elemendid.

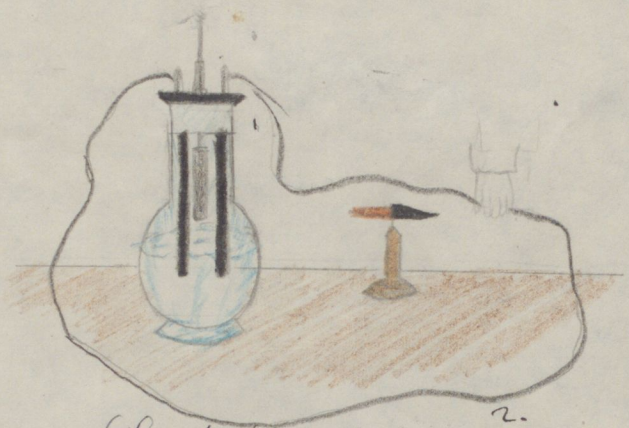
Elektripirn



Elektrikella nupu
läbilõik



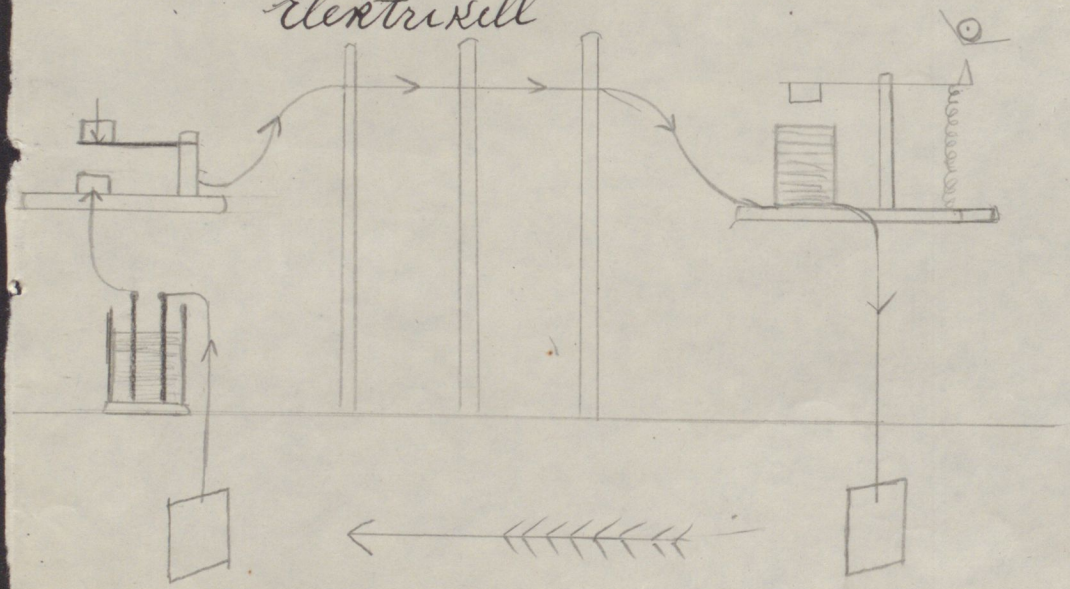
Elektrivoolu mõju magnetnõelasse



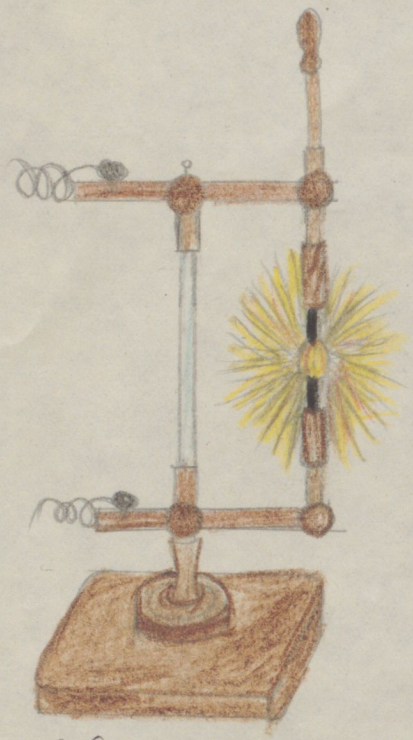
2.

Elektrivoolu mõju magnetnõelasse

Elektrikell



Telegraafijaama skeem



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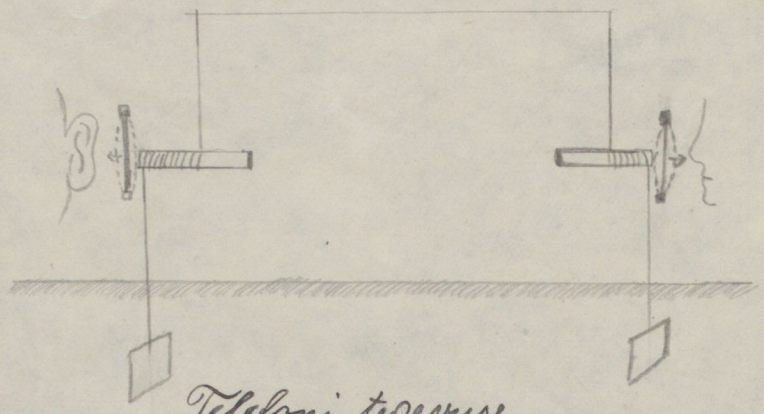

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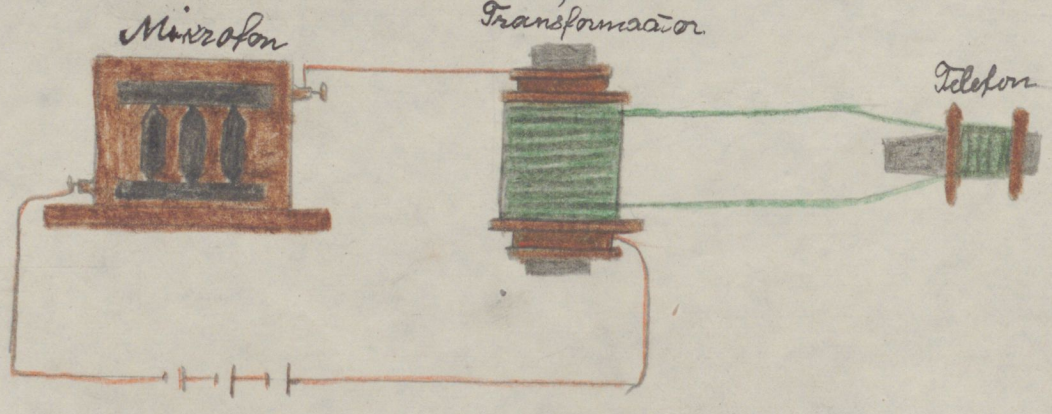

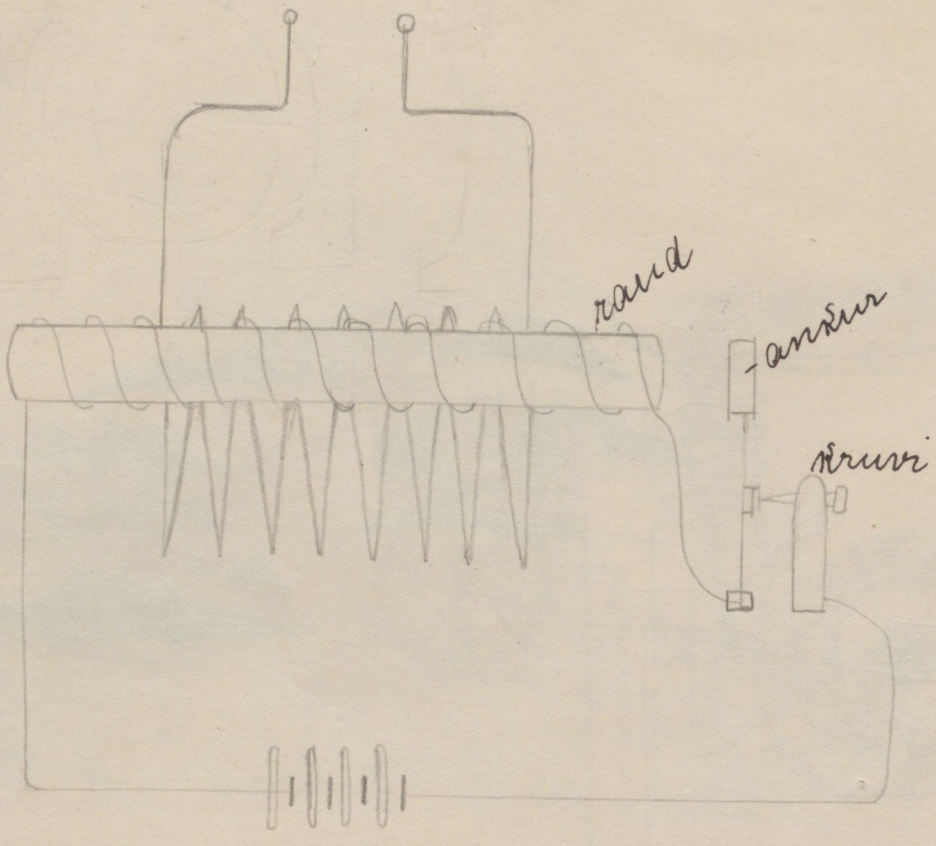

Inductor