

.c.g.



Cours pour Elèves - Conducteurs

—
Cours 124.20

—
TRACTION ELECTRIQUE

FIGURES

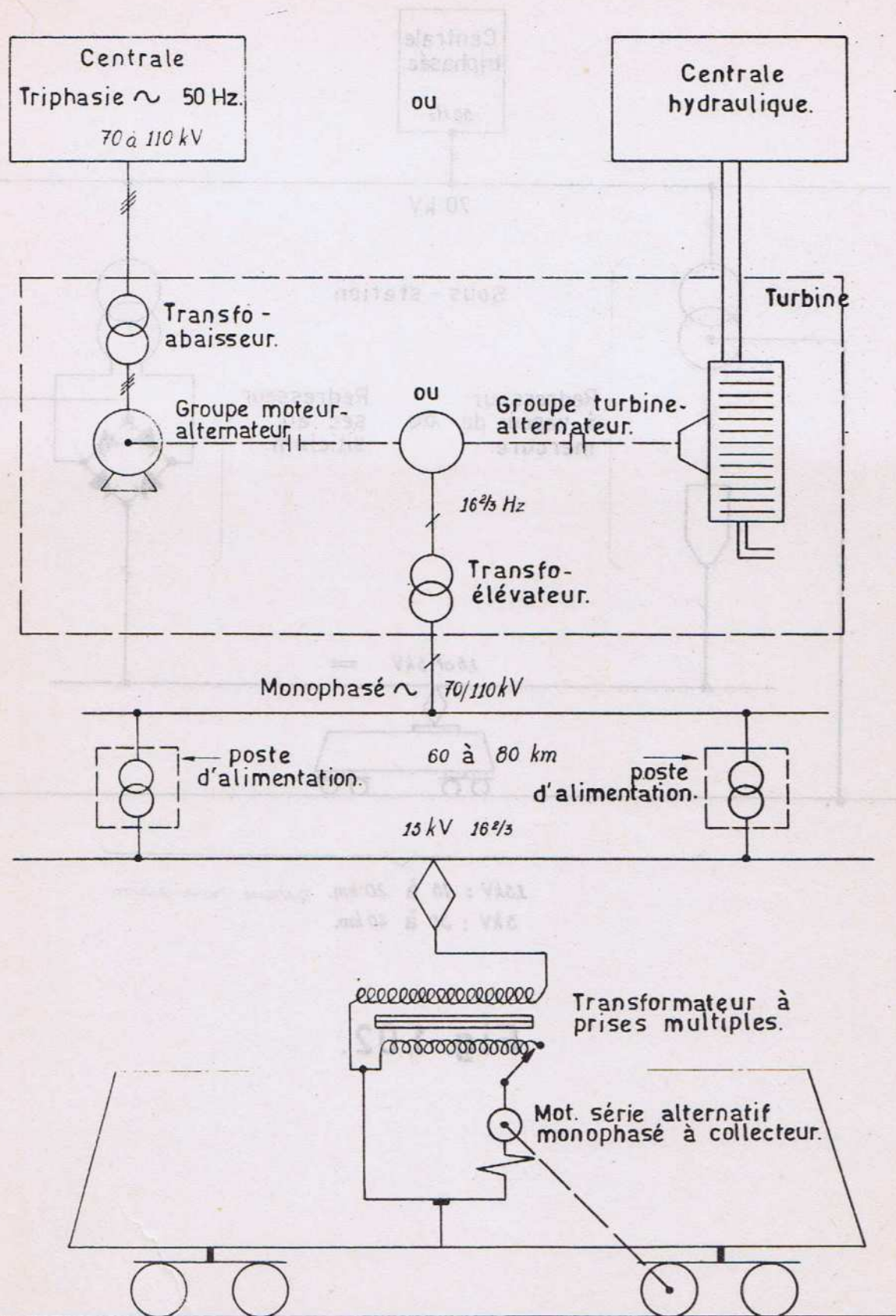


Fig. 1.01.

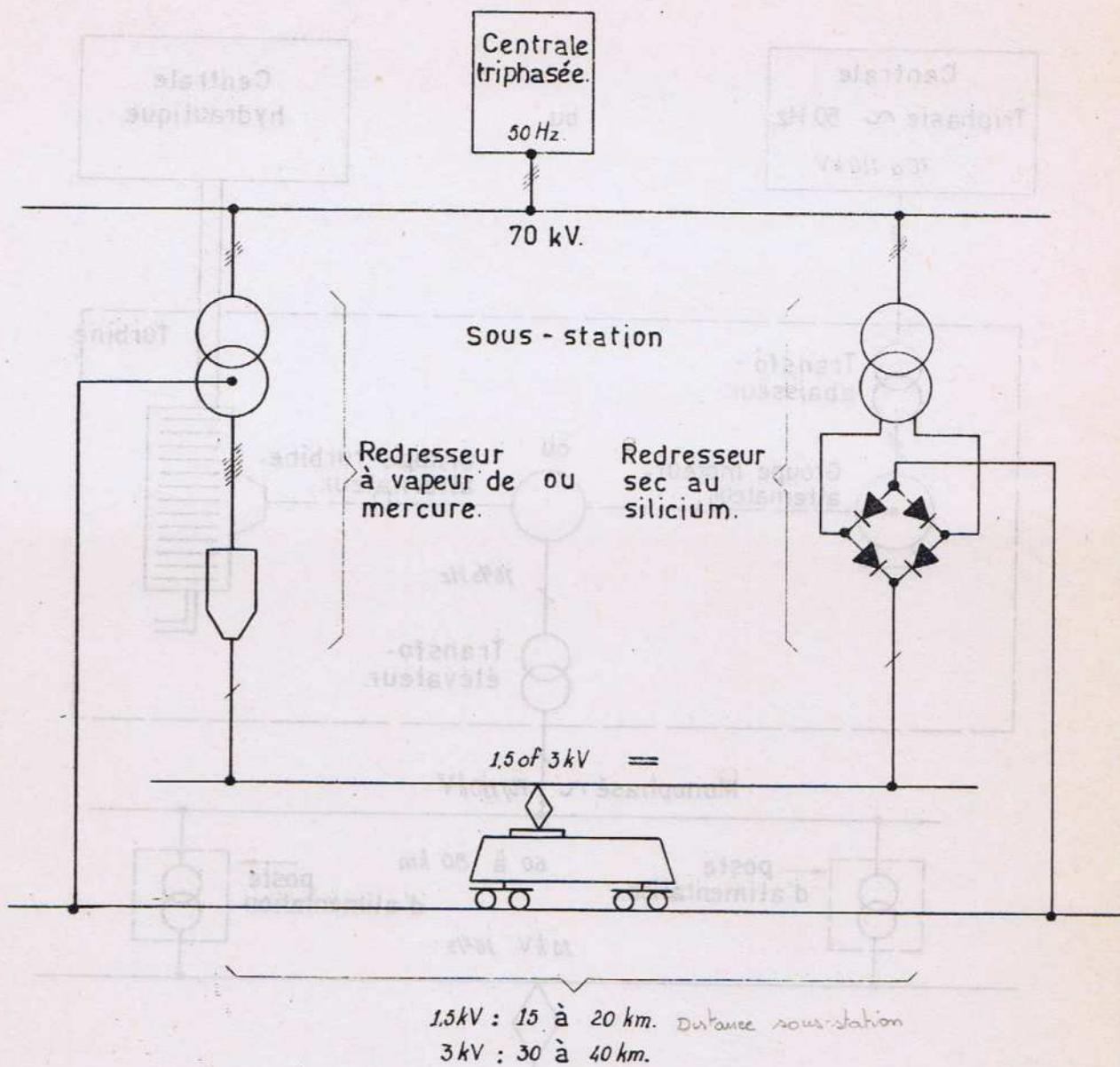


Fig. 1.02.

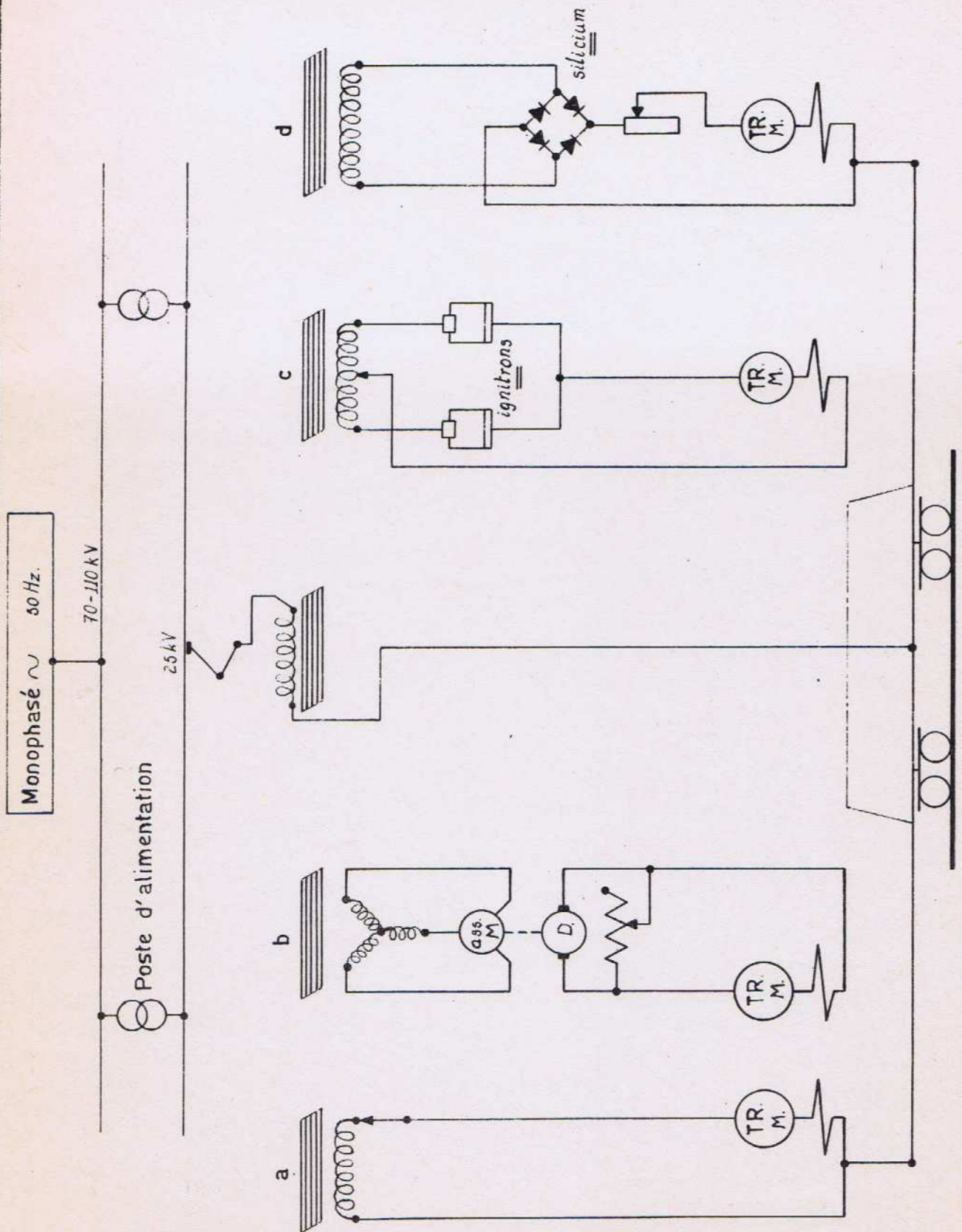


Fig. 1.03.

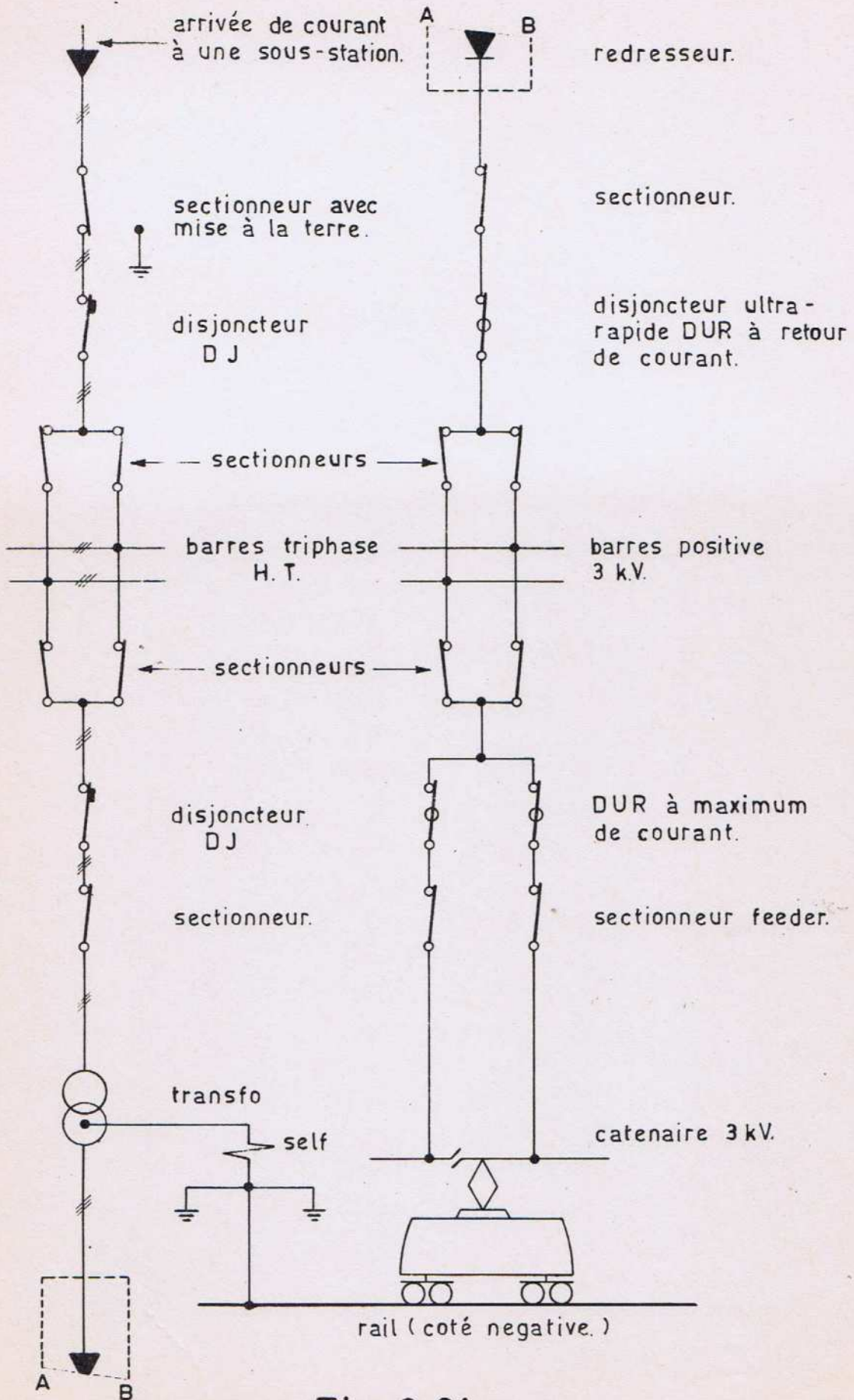


Fig. 2.01.

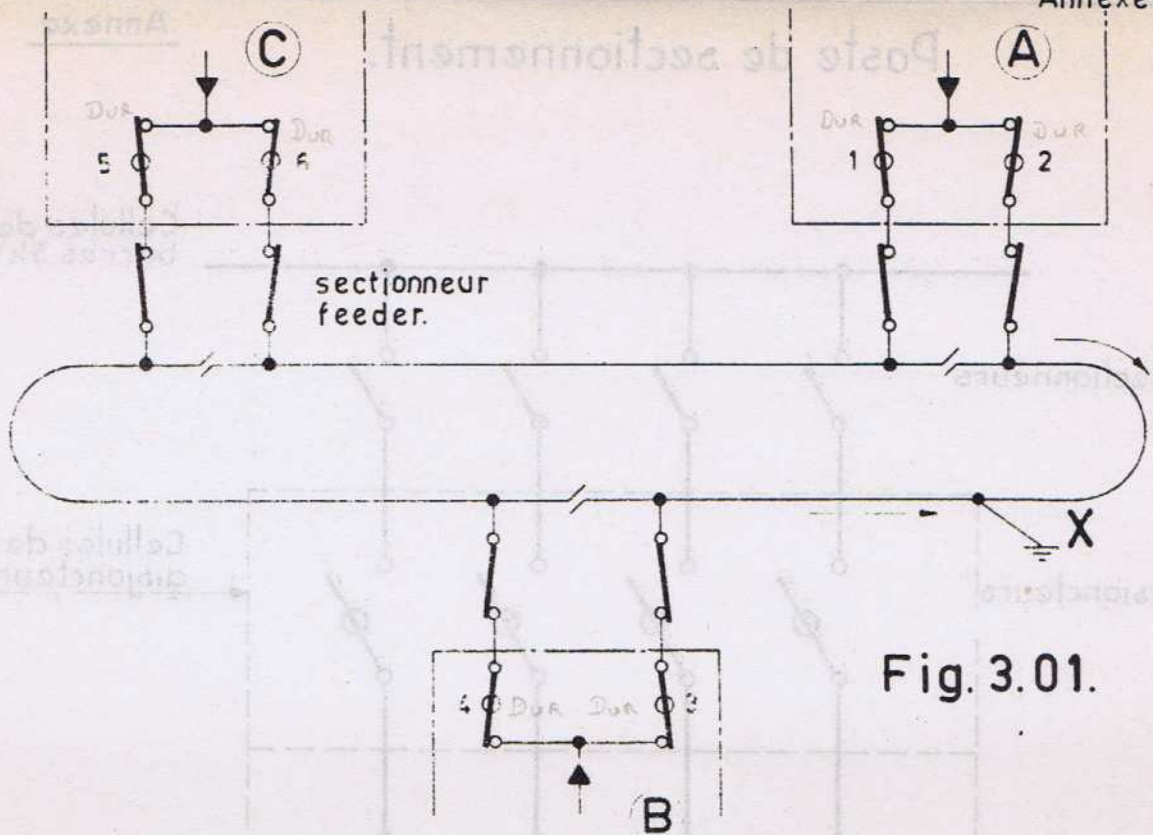


Fig. 3.01.

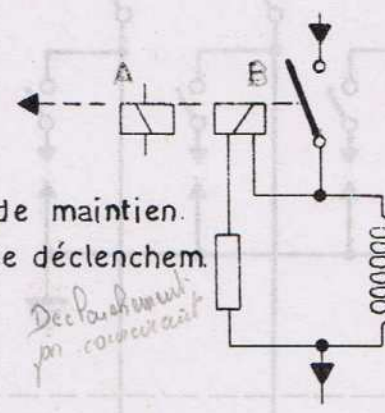


Fig. 3.02.

A: bobine de maintien.
B: bobine de déclenchement.

shunt inductif.
de shunt sert à empêcher le déclenchement par une ou des machines.

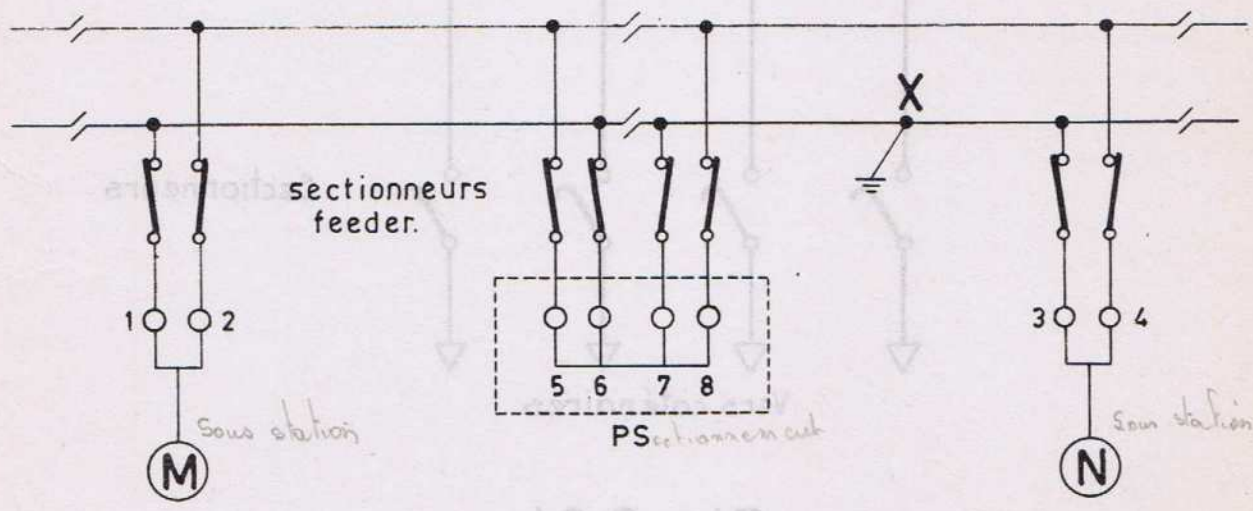


Fig. 3.03.

Poste de sectionnement.

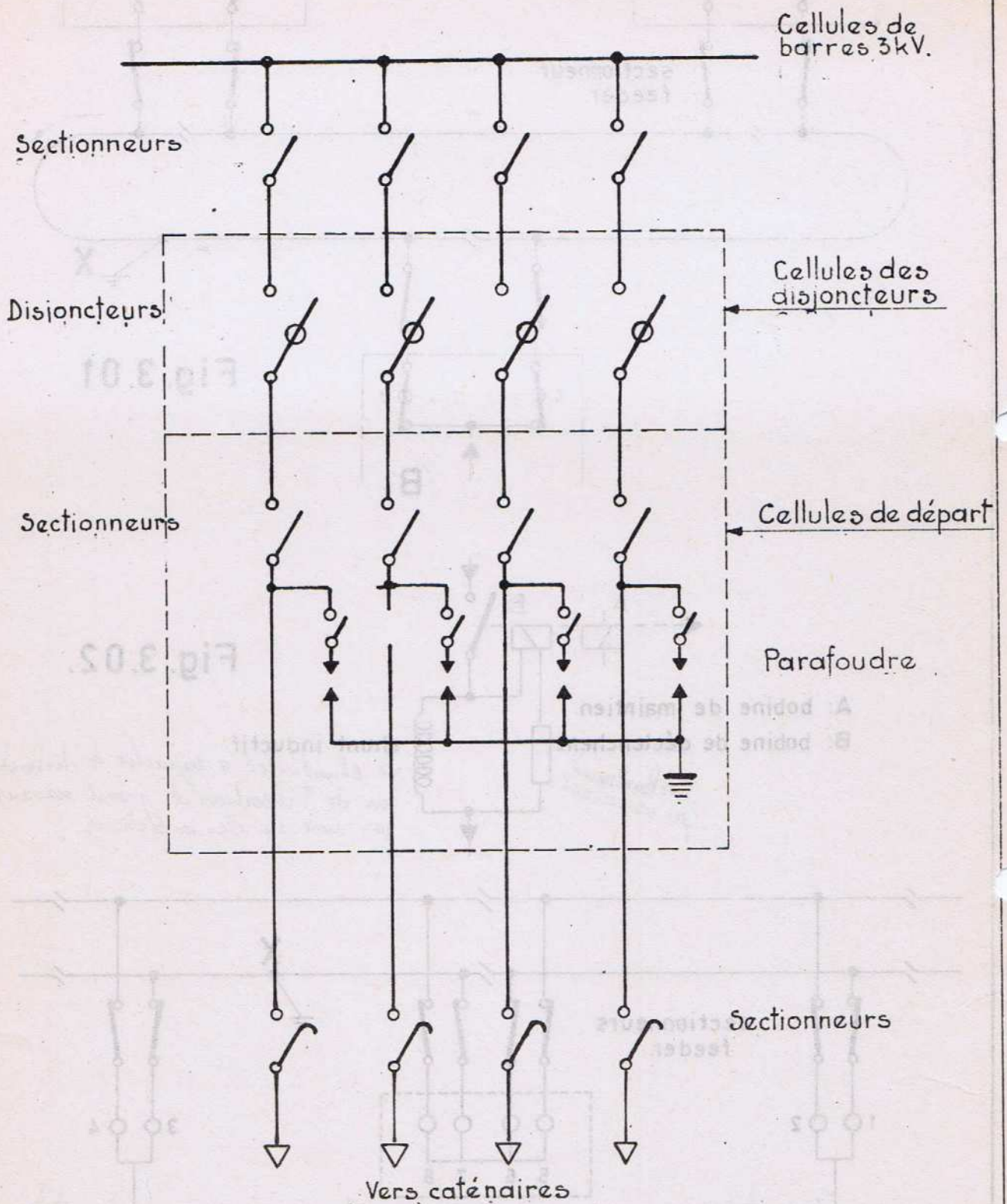


Fig. 3.04.

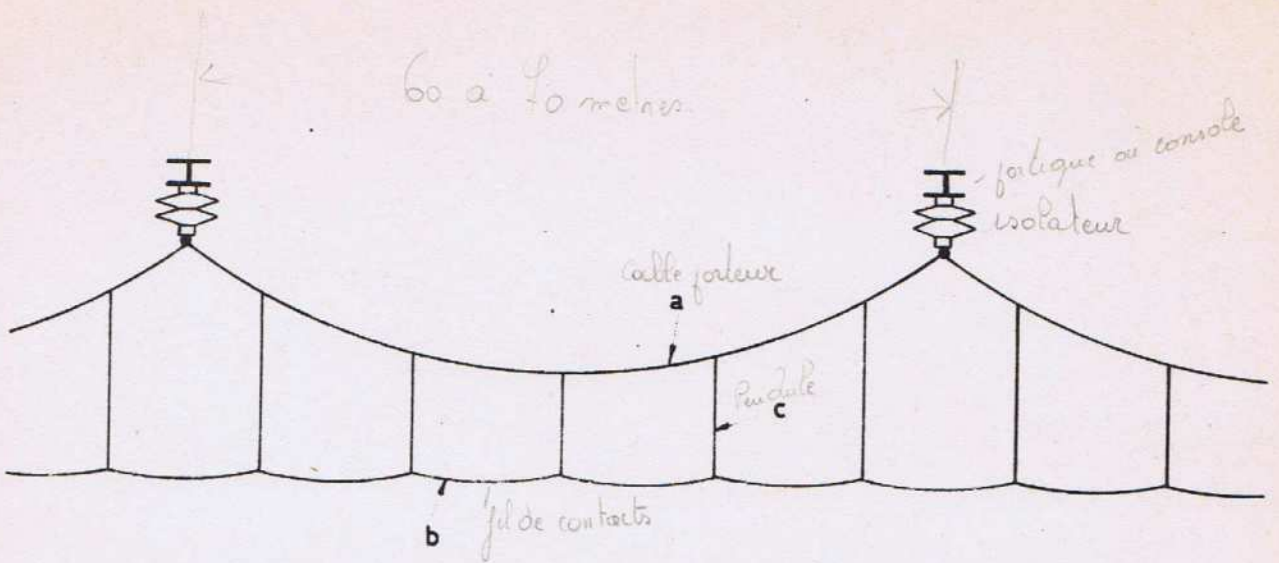


Fig. 3.06. Catenaire Simple.

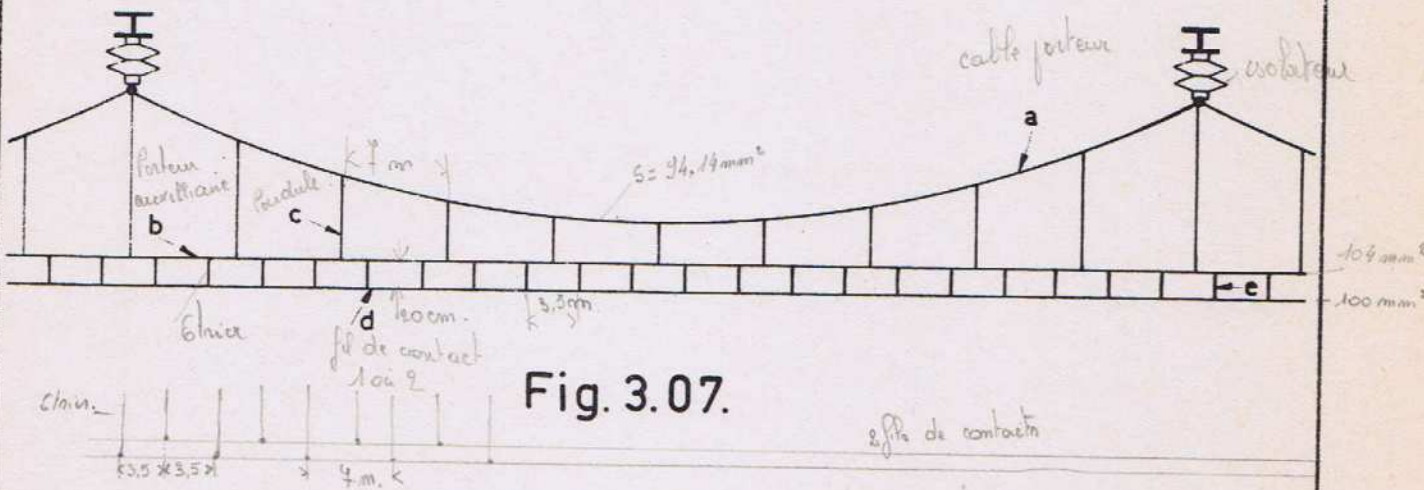


Fig. 3.07.

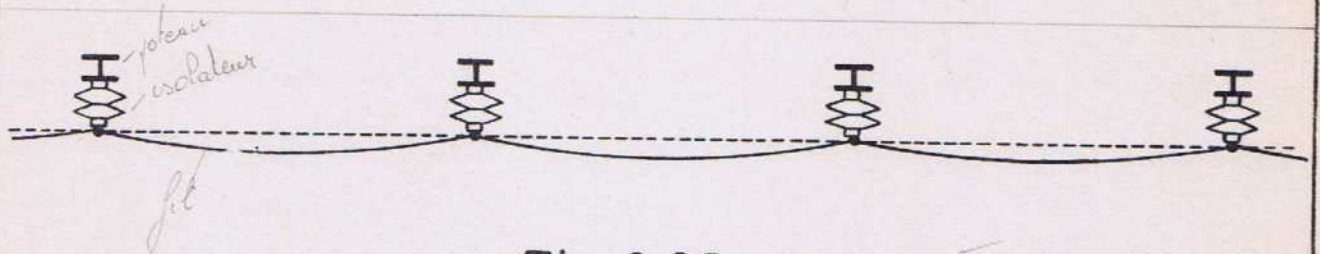


Fig. 3.05. Suspension Tramway
Vitesse max. 40 km/h

IMP
Associé Serrurier

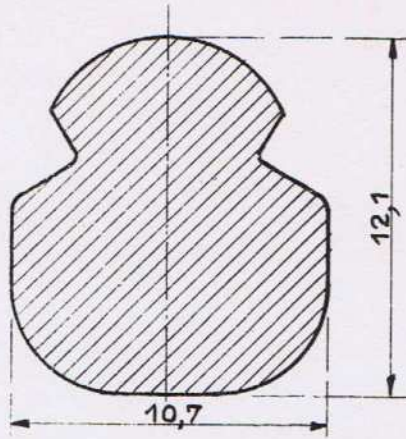


Fig. 5.01.

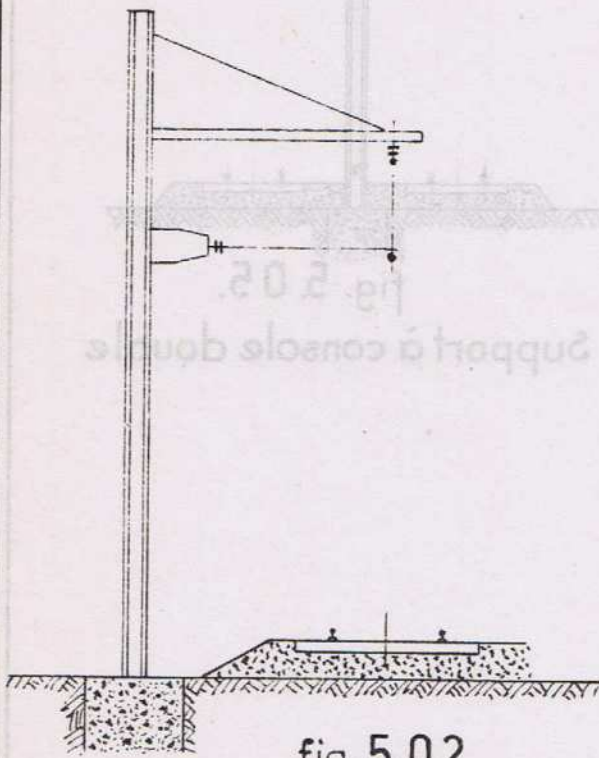


fig. 5.02

Poteau à console haubanée

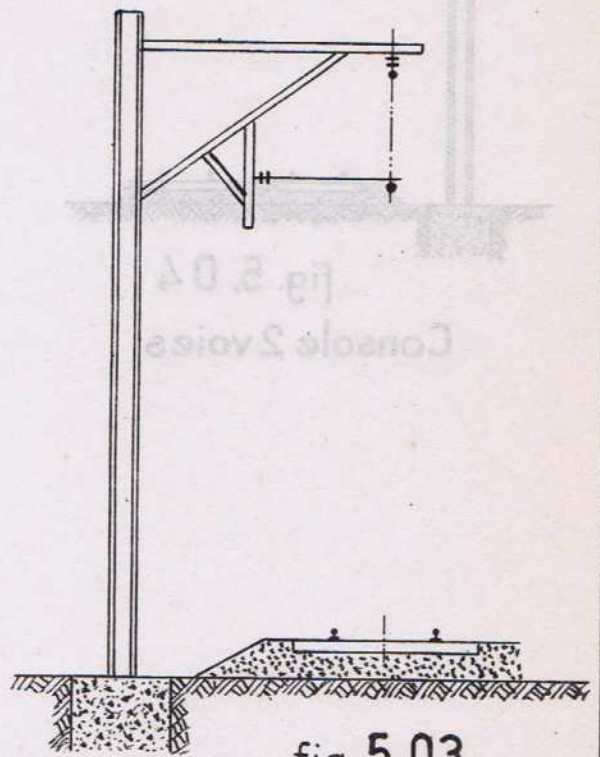


fig. 5.03.

Poteau à console contre-fichée

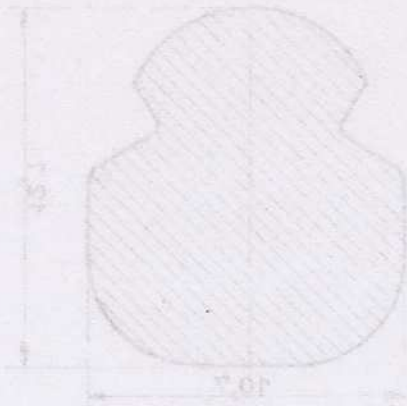


Fig. 5.01

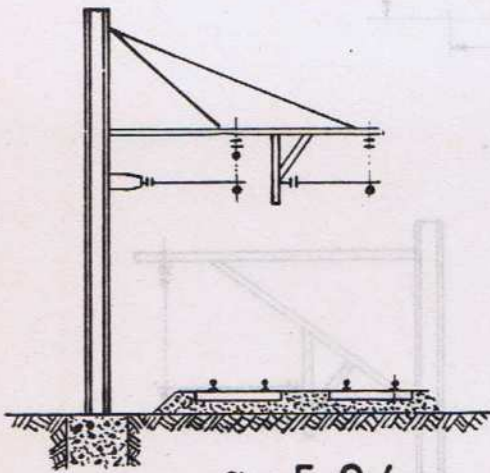


fig. 5.04
Console 2 voies

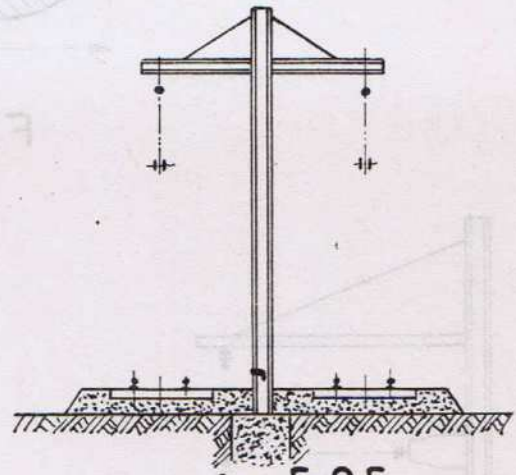


fig. 5.05.
Support à console double

Fig. 5.07

Poutre
GREY

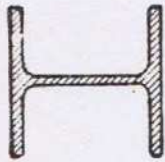
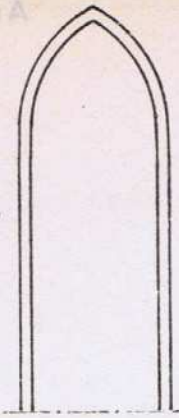
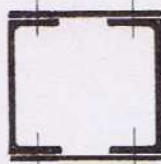
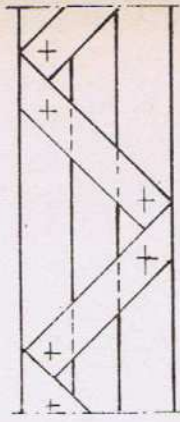


Fig. 5.06

acier profilé



Portique rigide à traverse articulée.

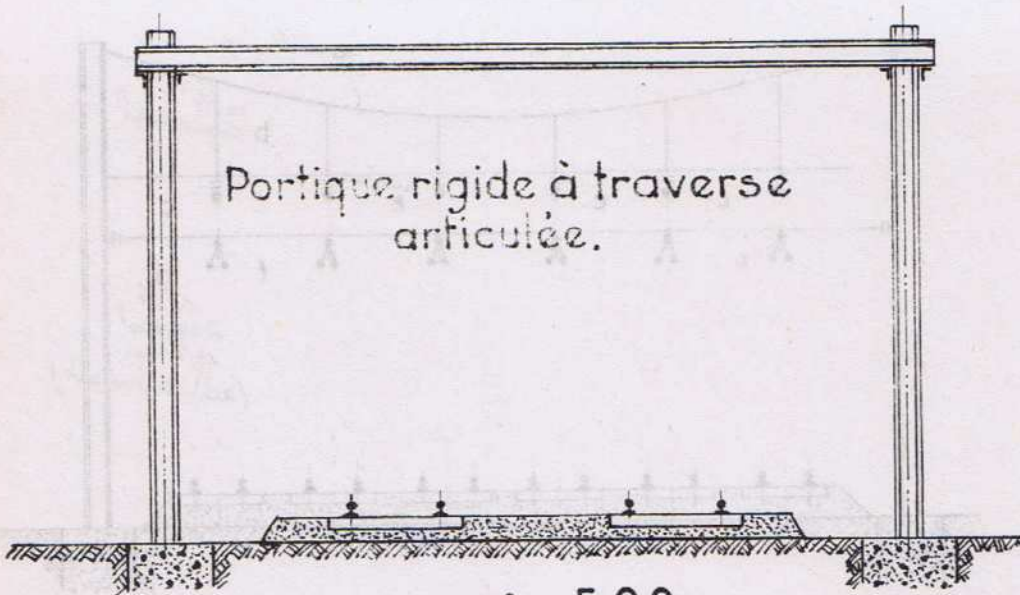
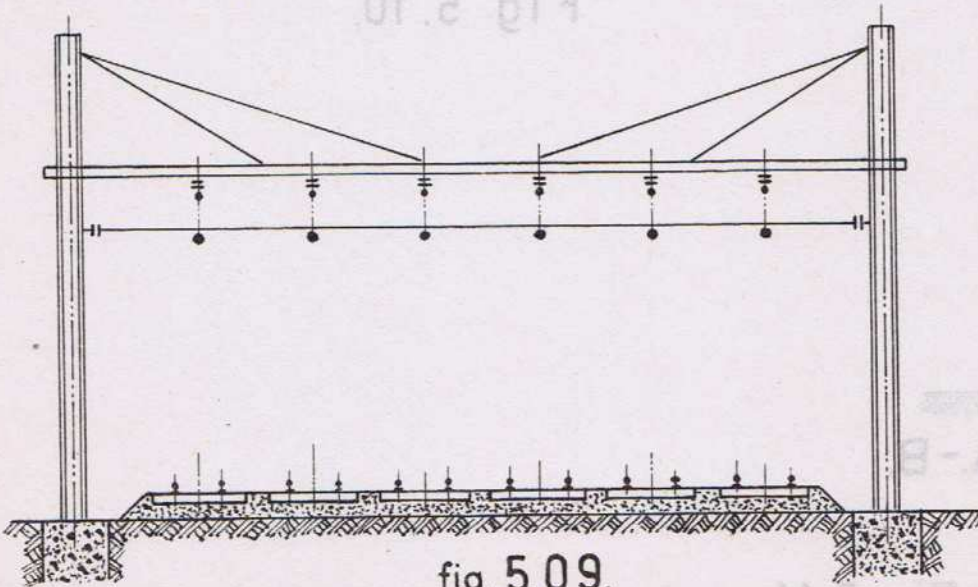


fig. 5.08

fig. 5.09.
Portique rigide.



Portique souple.

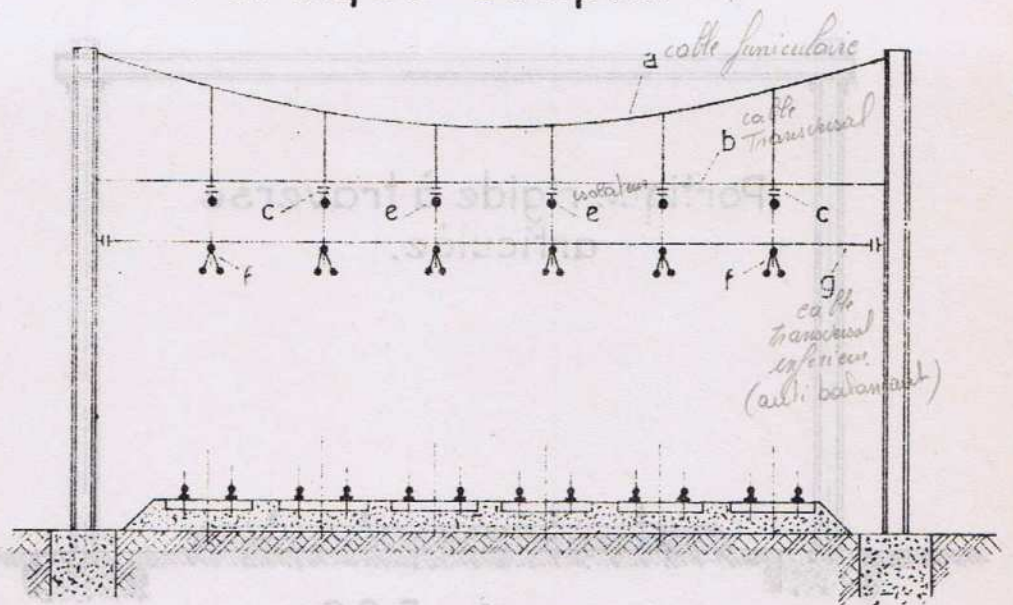
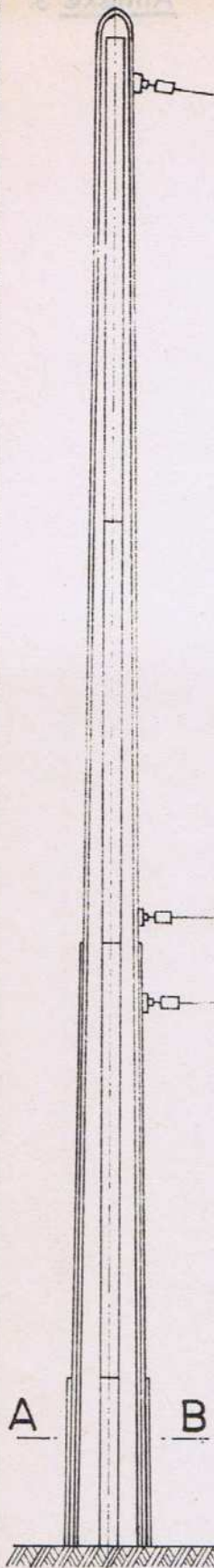


Fig. 5.10.



Coupe A.-B.



Fig. 5.11.

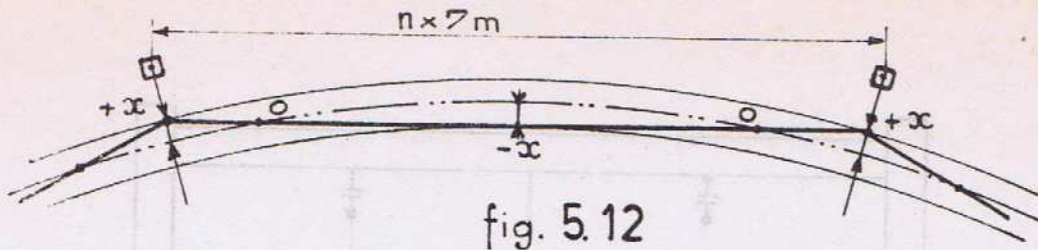
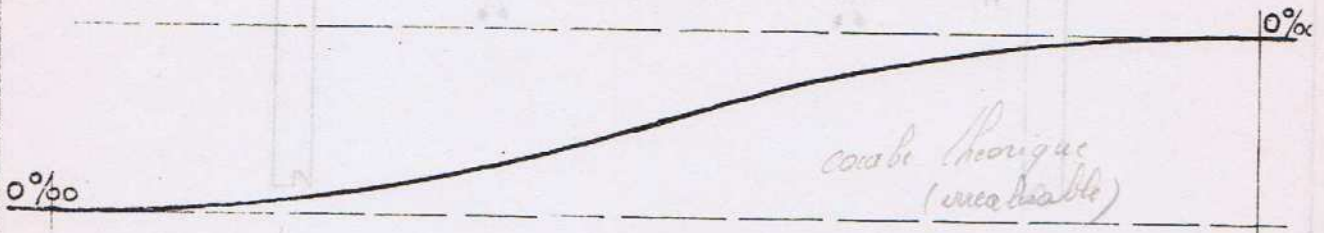


fig. 5.12



Changement de niveau cabrais en hauteur. 6‰ max
 $4,8\text{‰}$ min

fig. 5.13

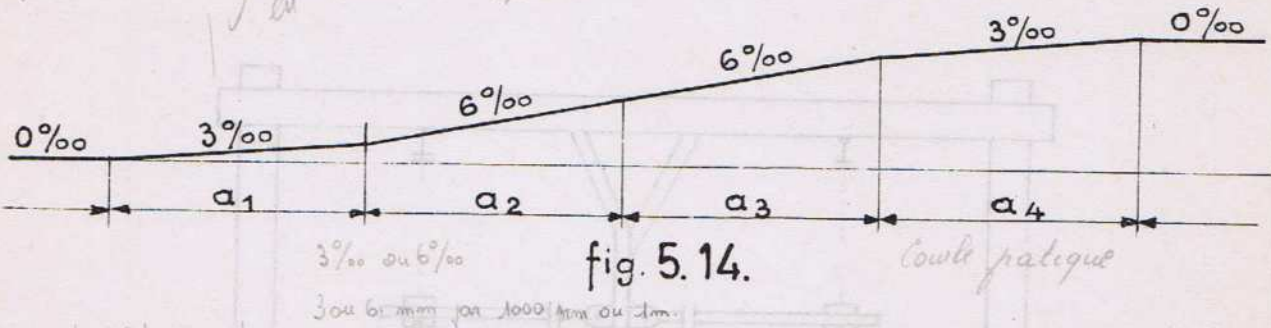


fig. 5.14.

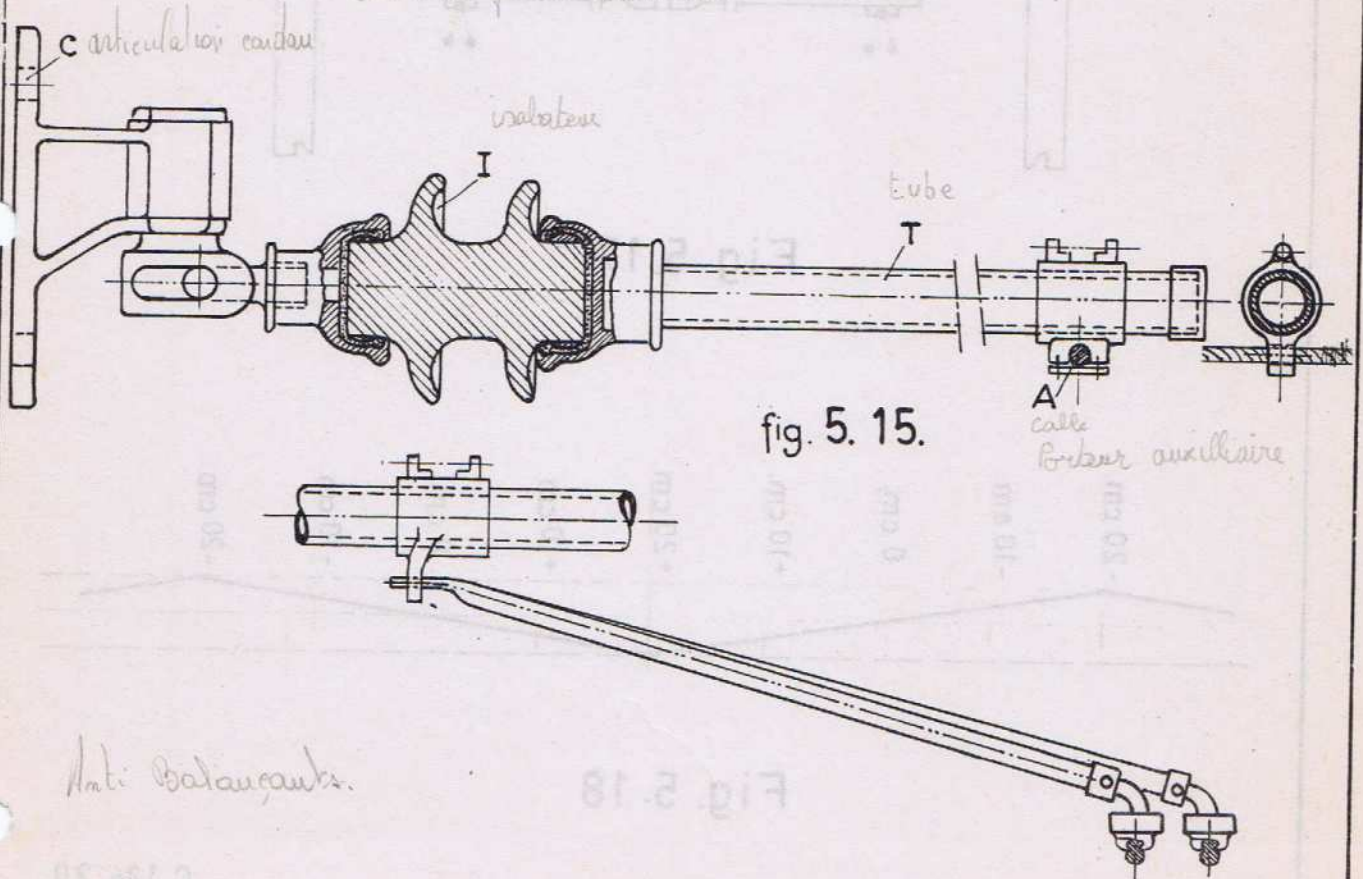


fig. 5.15.

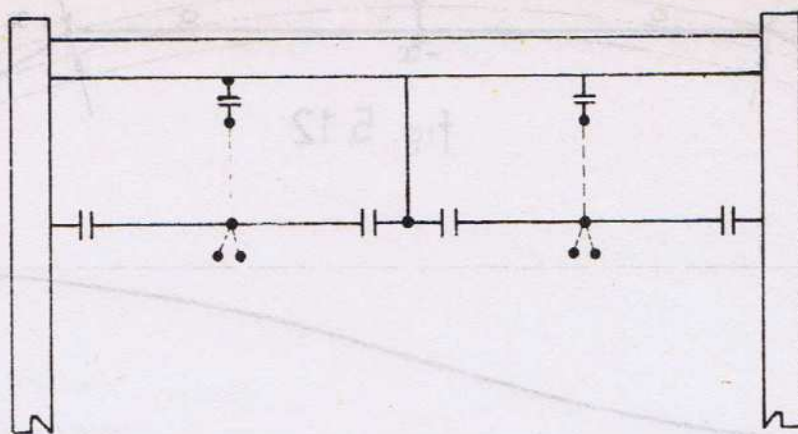


Fig. 5.16

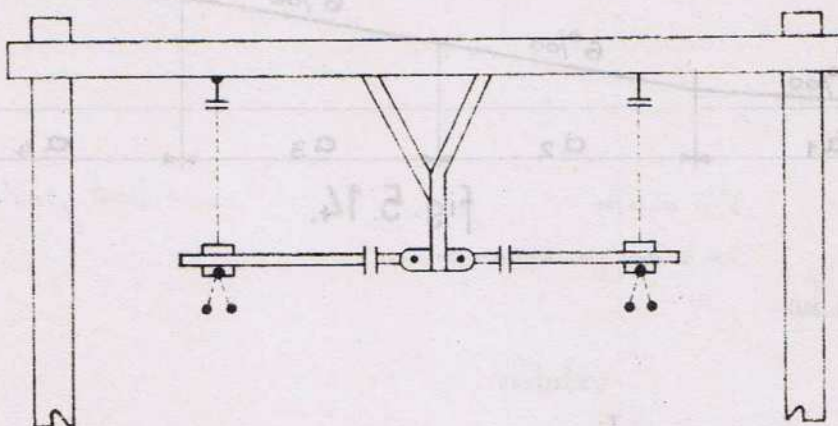


Fig. 5.17

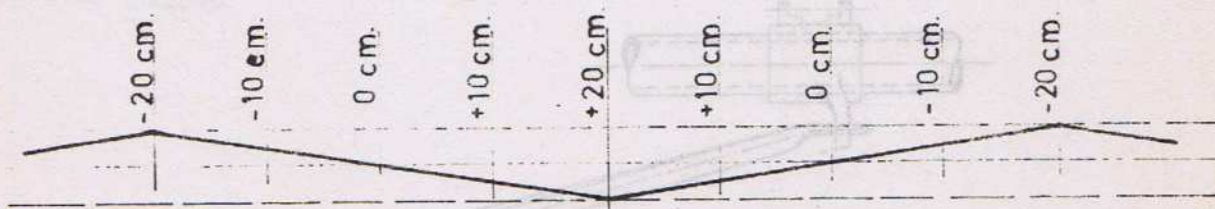


Fig. 5.18

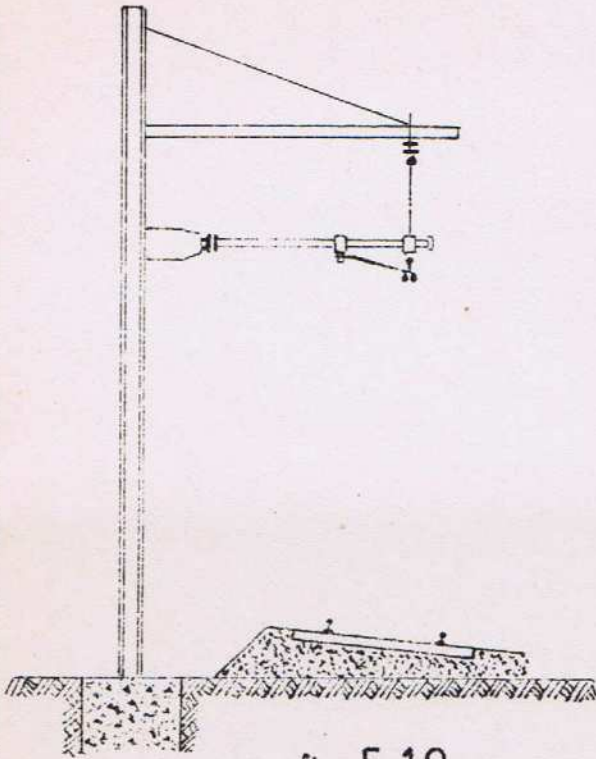


fig. 5.19

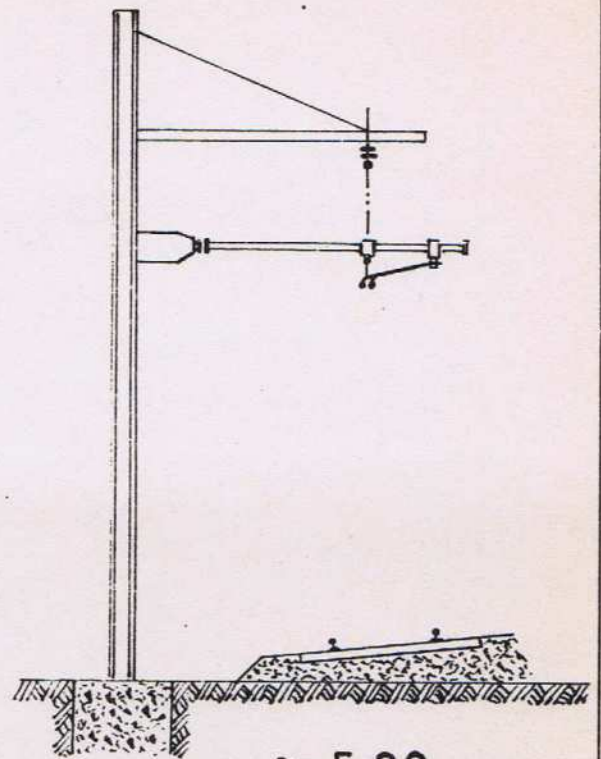


fig. 5.20.

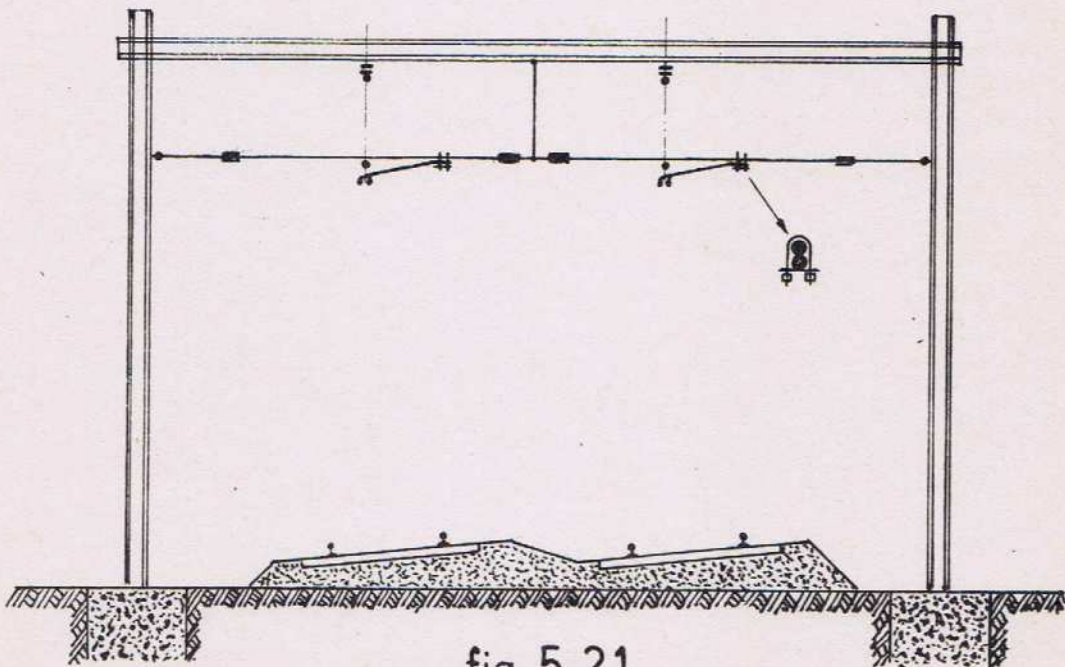


fig. 5.21

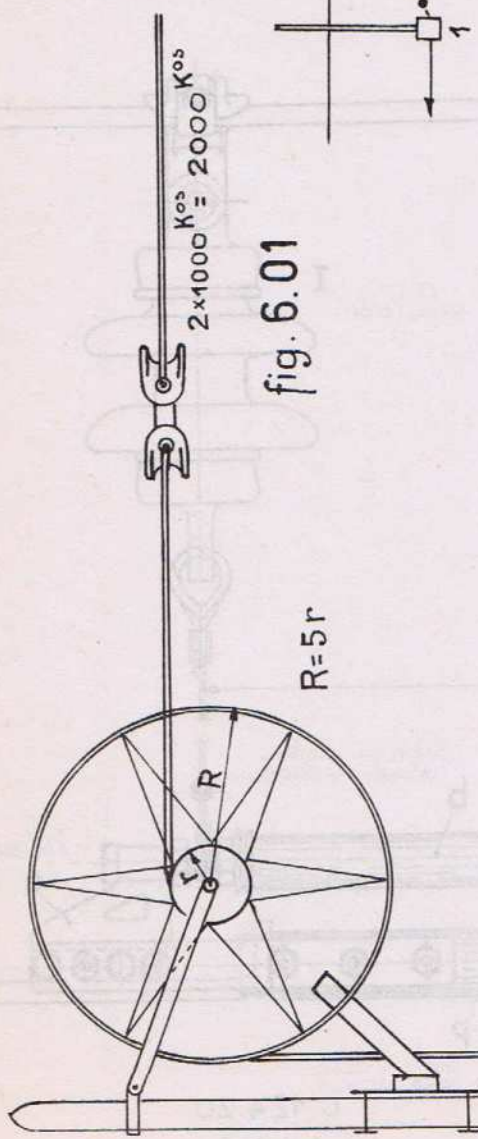


fig. 6.01

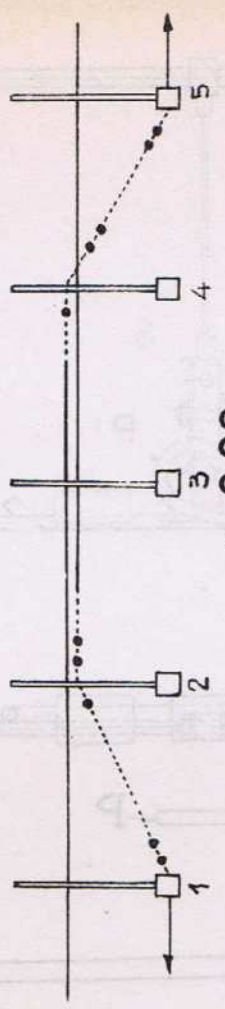


fig. 6.02

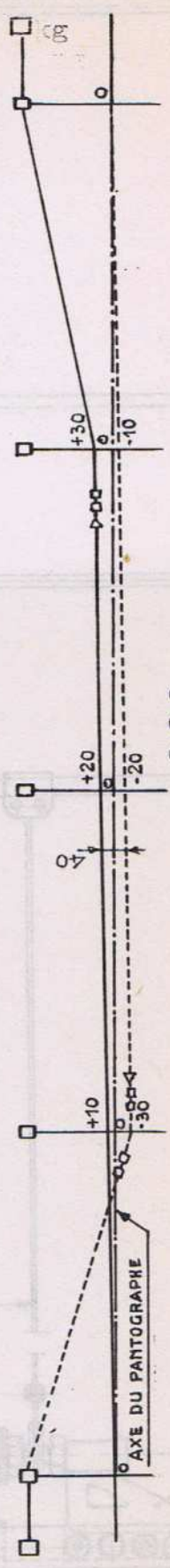
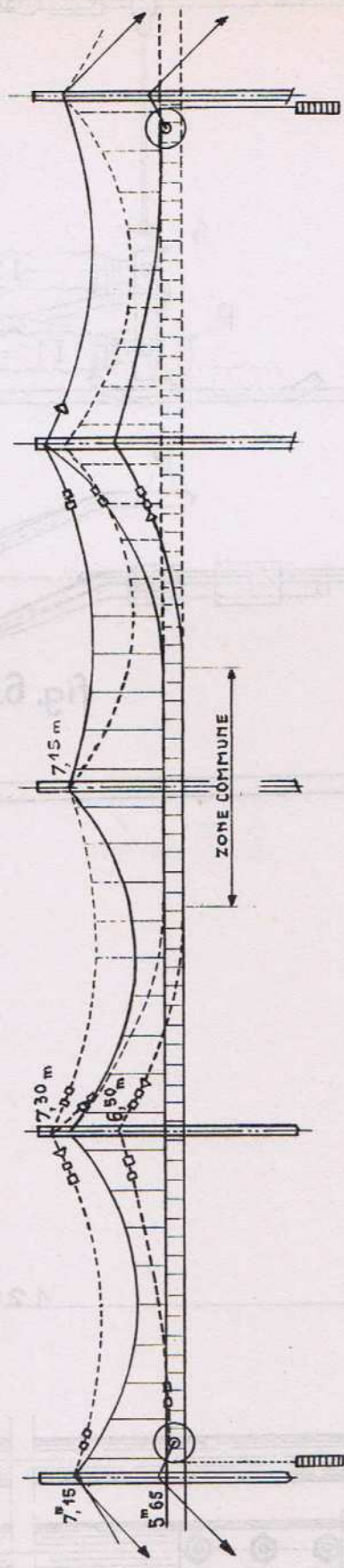


fig. 6.03

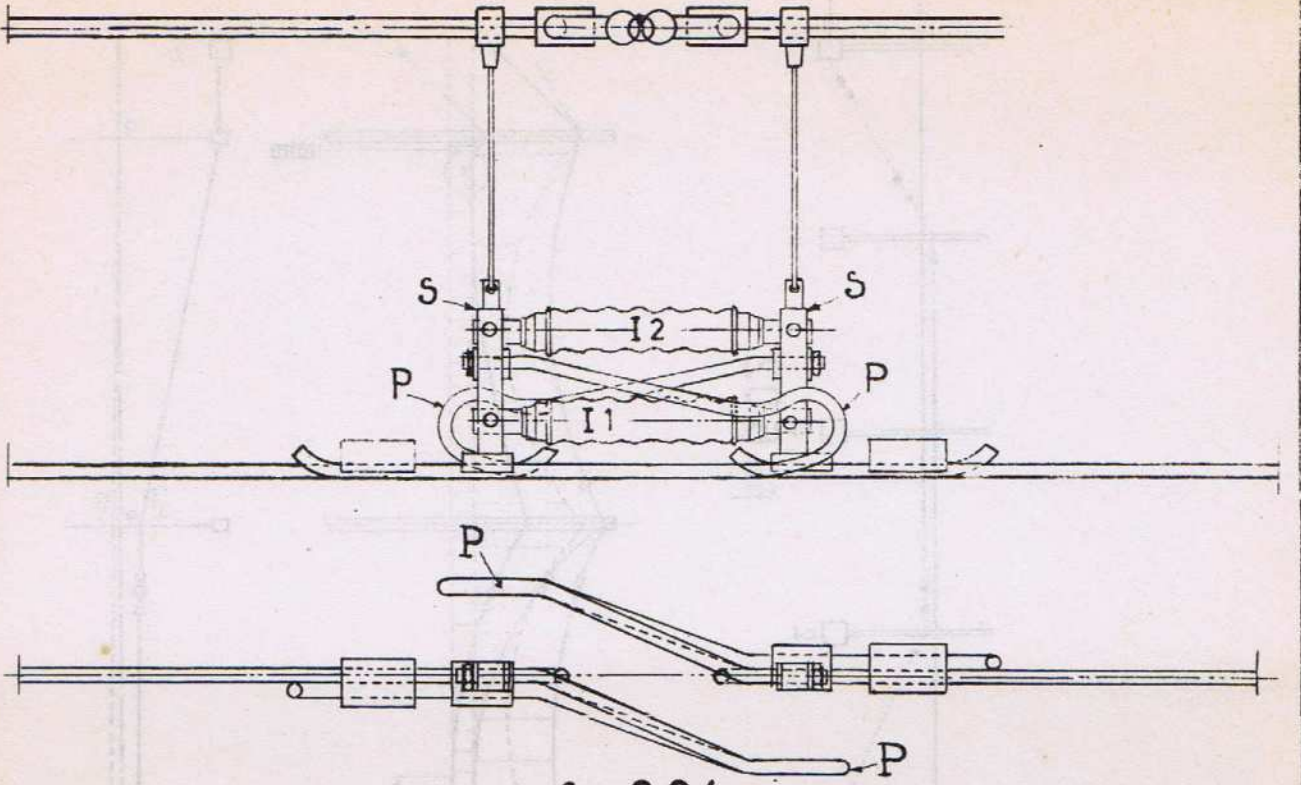


fig. 6.04

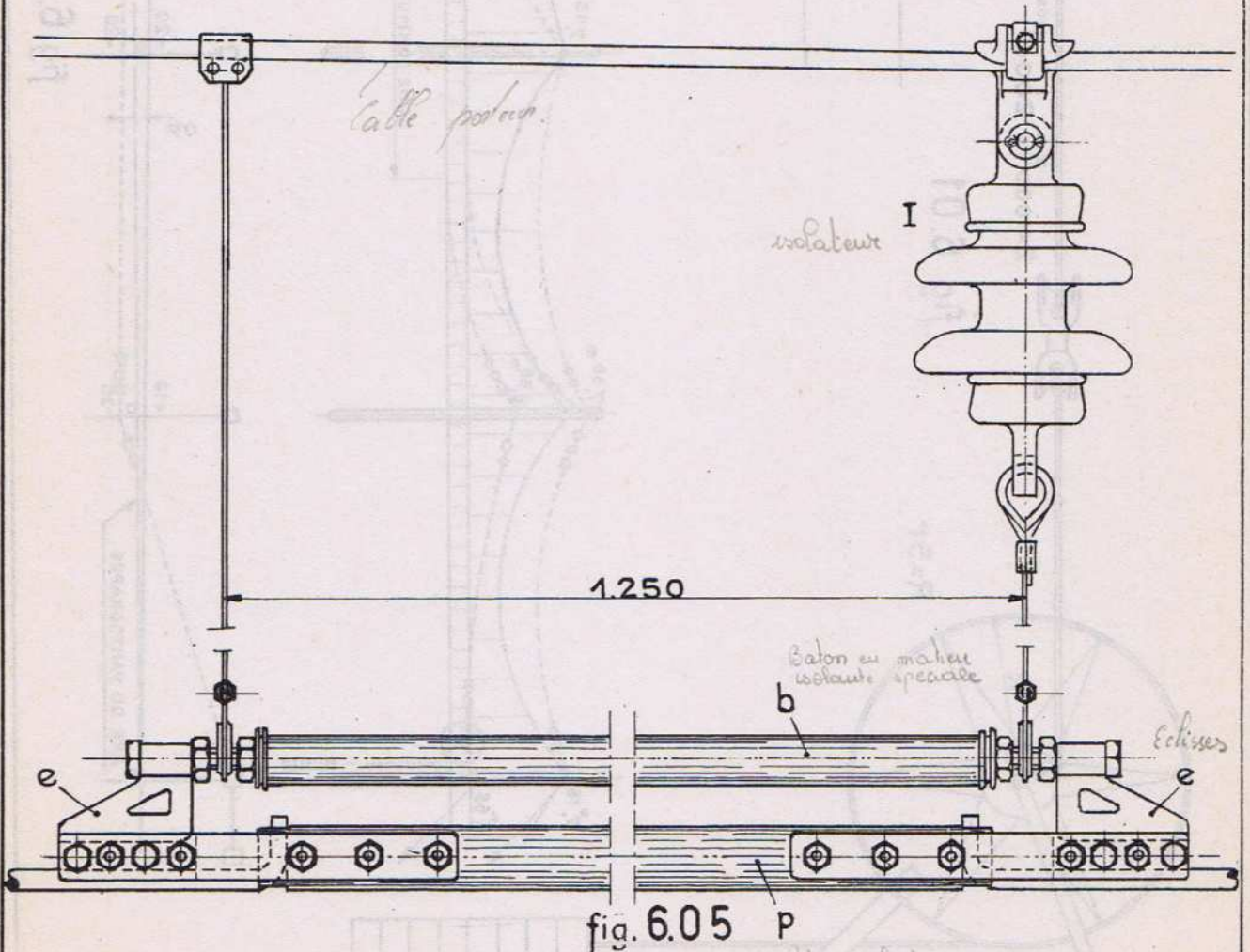


fig. 6.05

C.124.20

Leçon 6

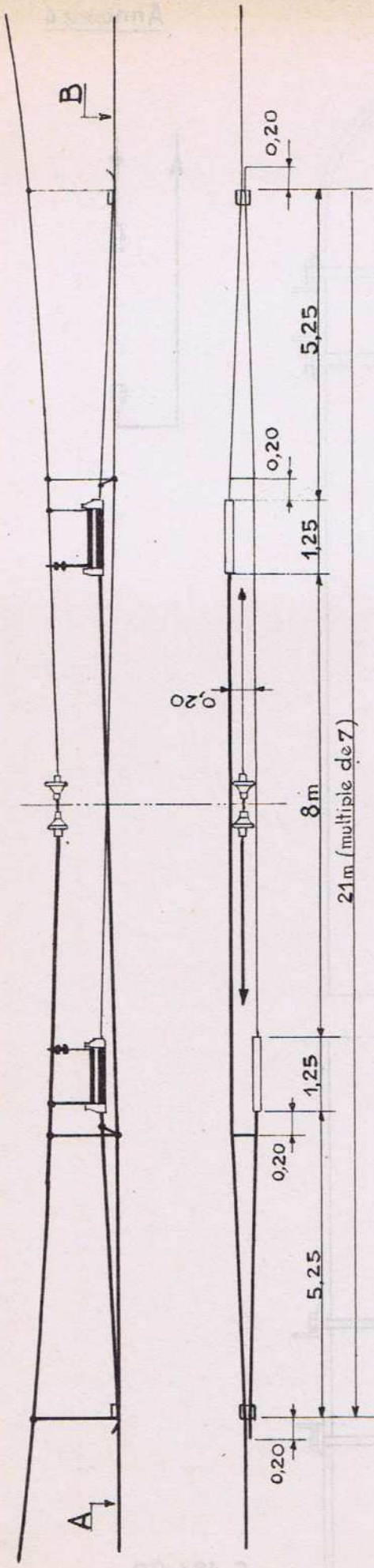


fig 6.06.

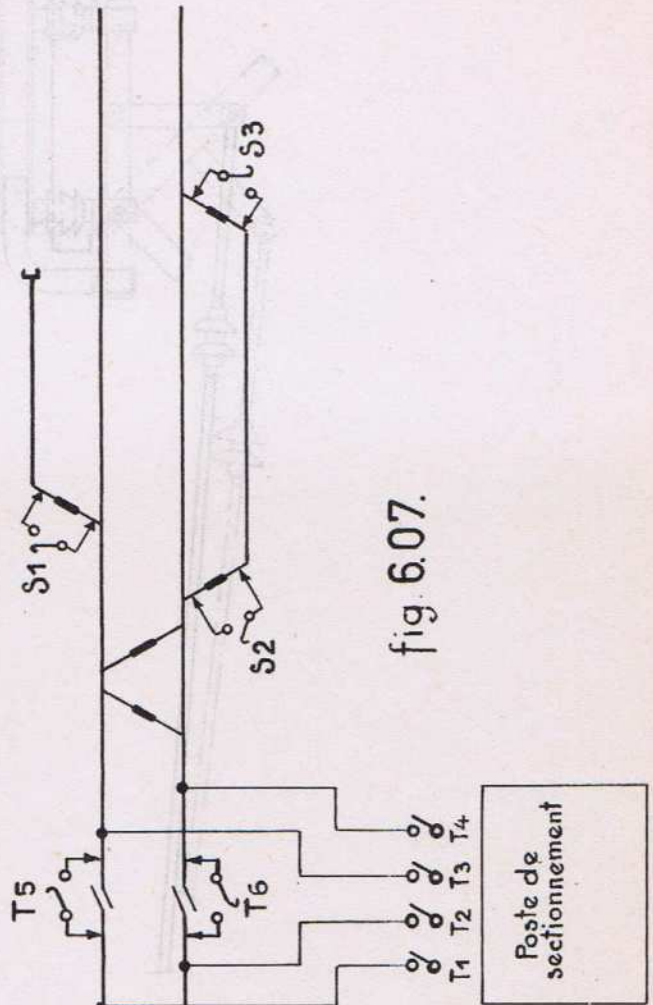


fig. 6.07.

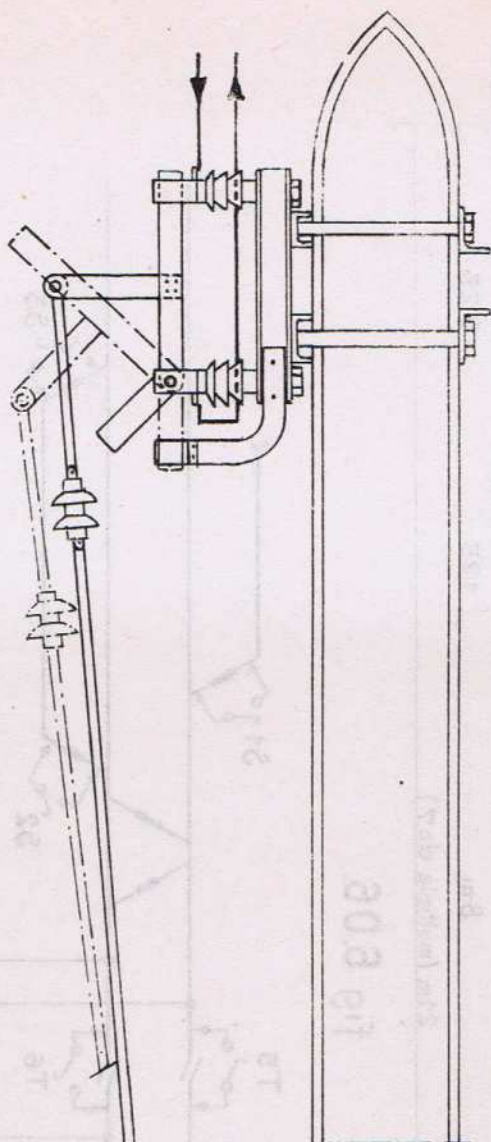


fig 6.08.

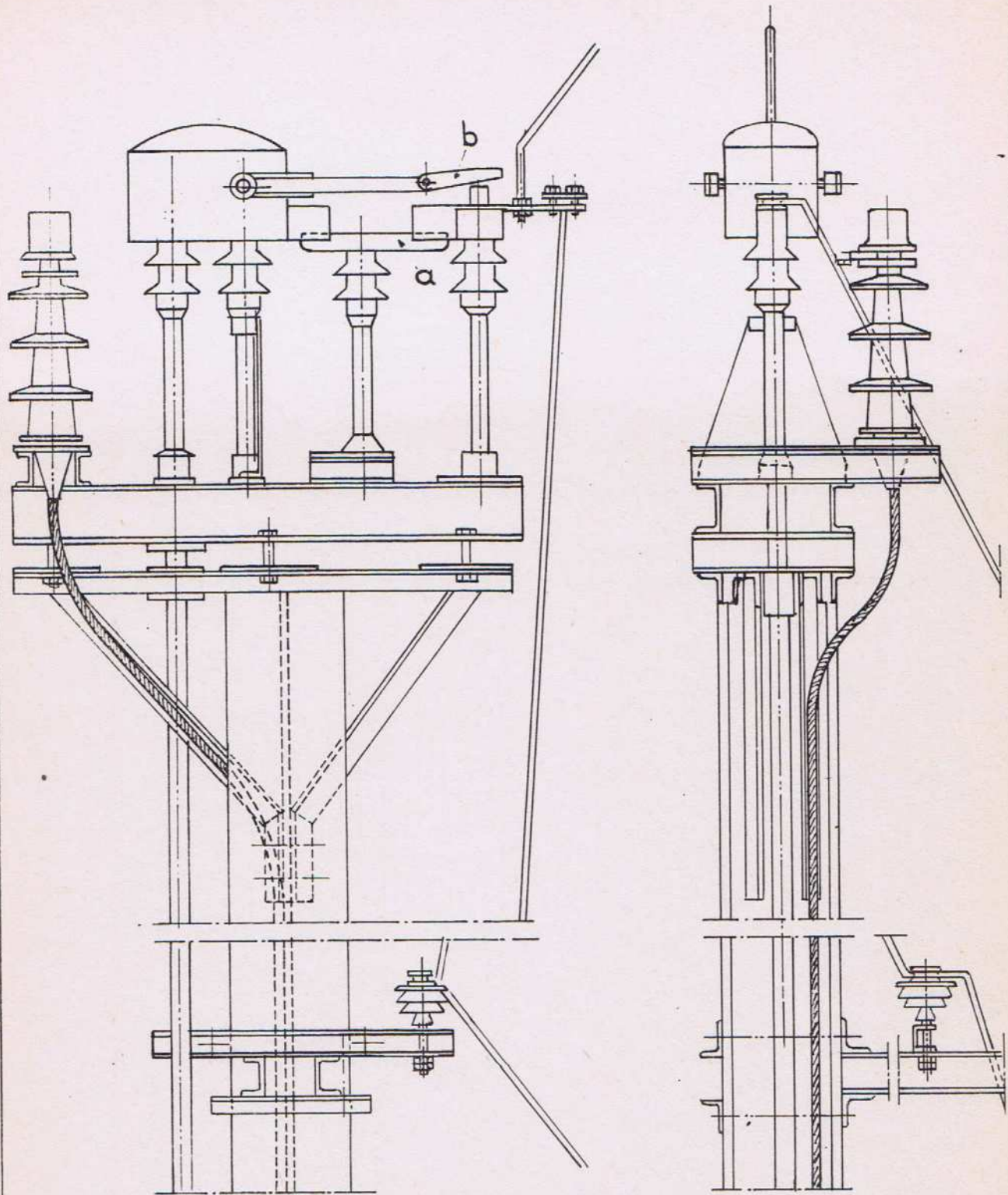


fig. 6.09.

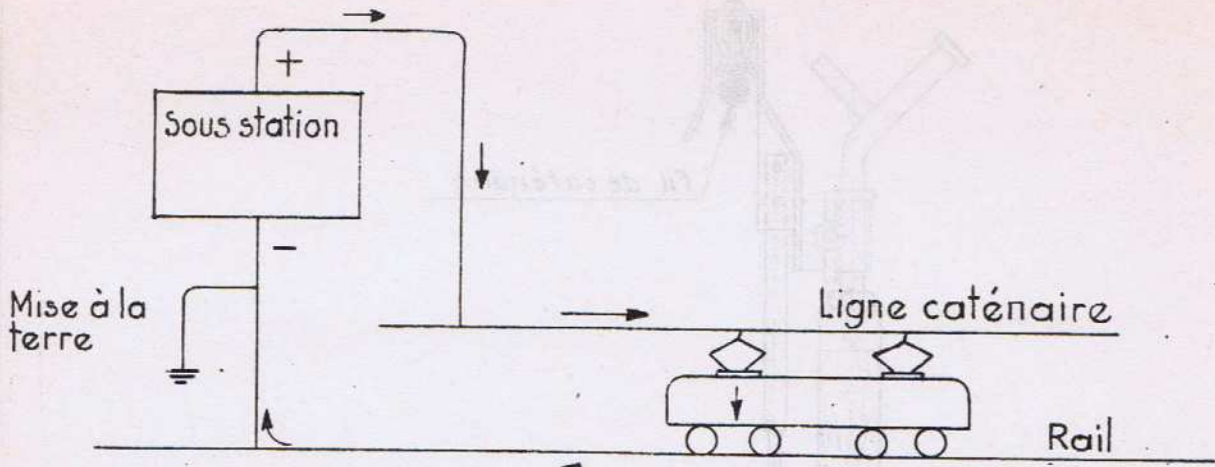


fig 7.01.

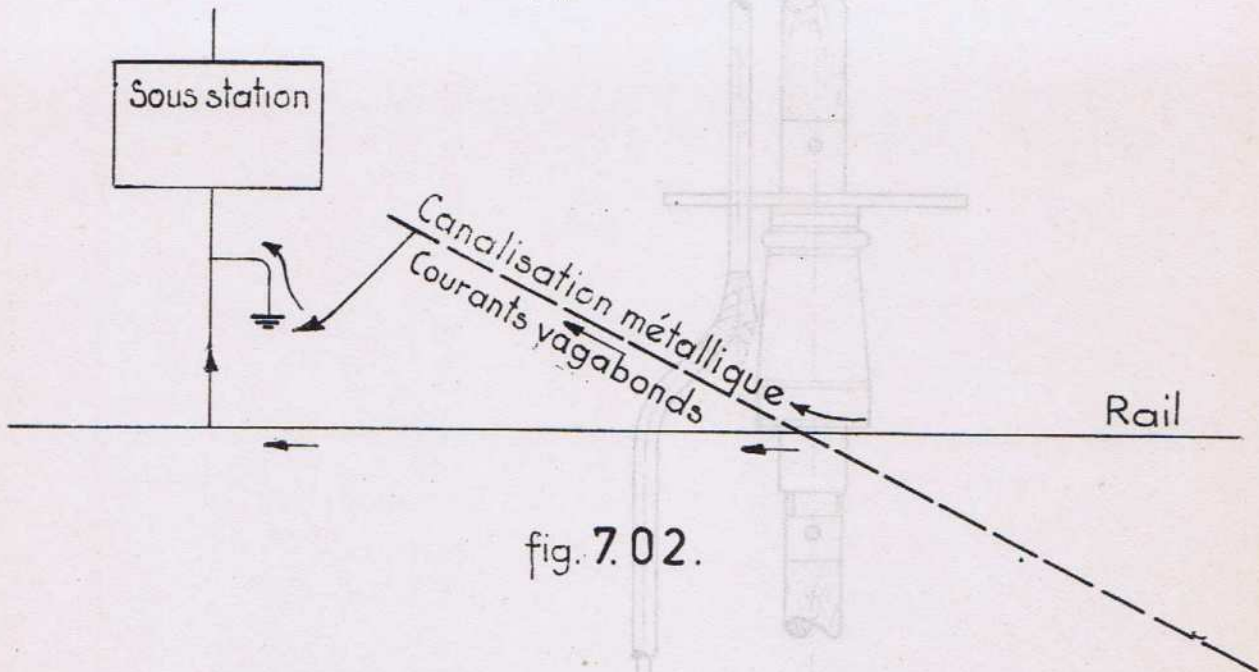


fig. 7.02.

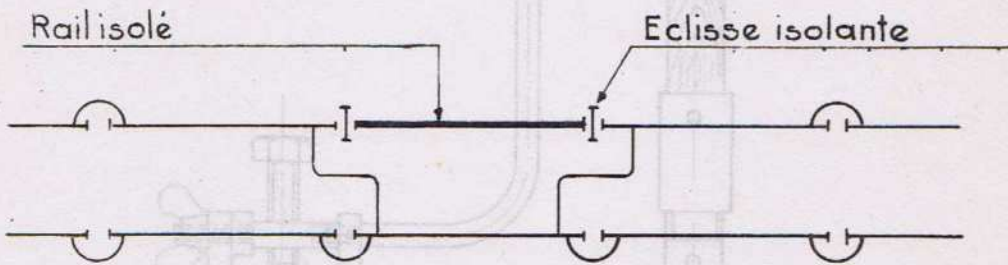


fig. 7.03.

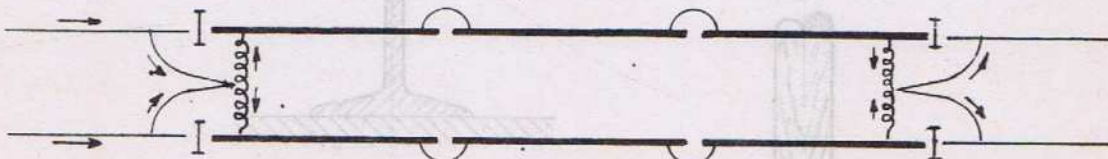


fig 7.04.

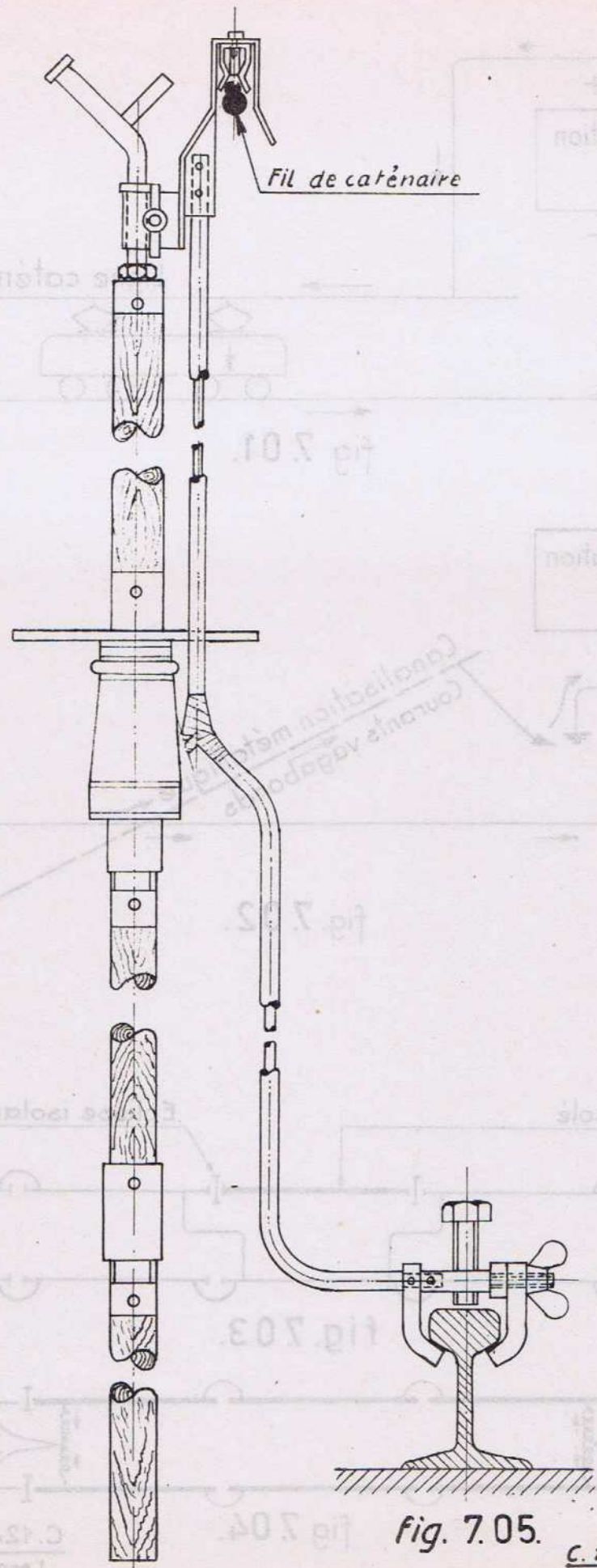


fig. 7.05.

C. 124.20
Leçon 7

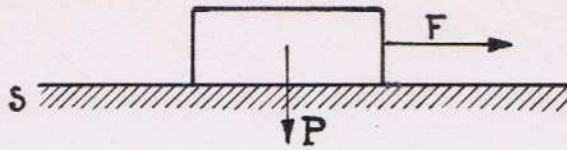


fig. 9.01.

Résistance spécifique d'une locomotive électrique.

Résistance spécifique en kg/tonne.

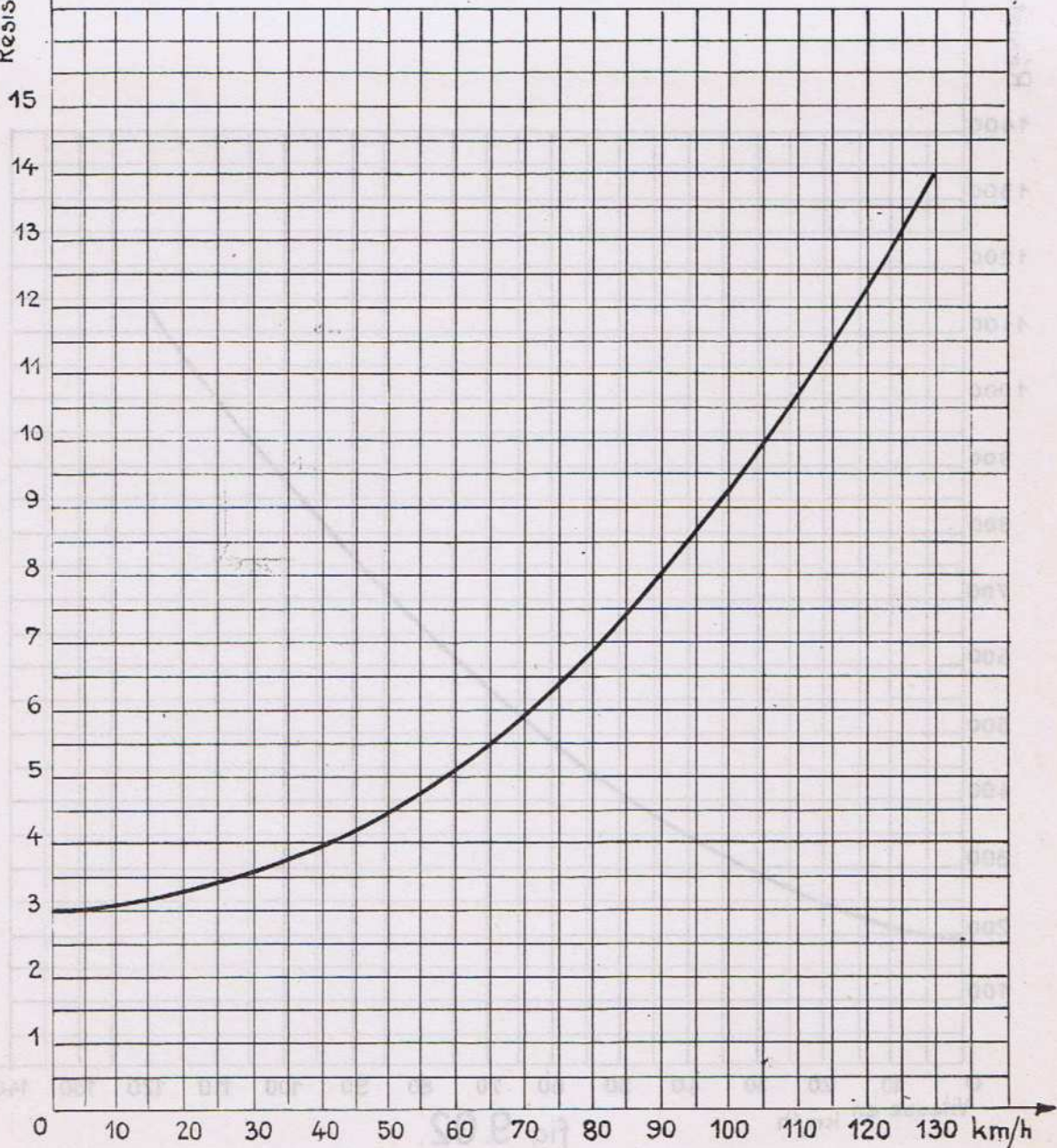
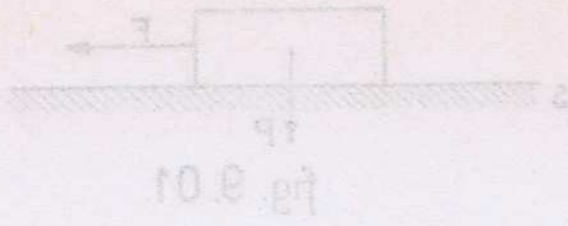


fig. 9.03.



da.N.
Résistance totale en kg.

Résistance propre de l'automotrice type 1939.

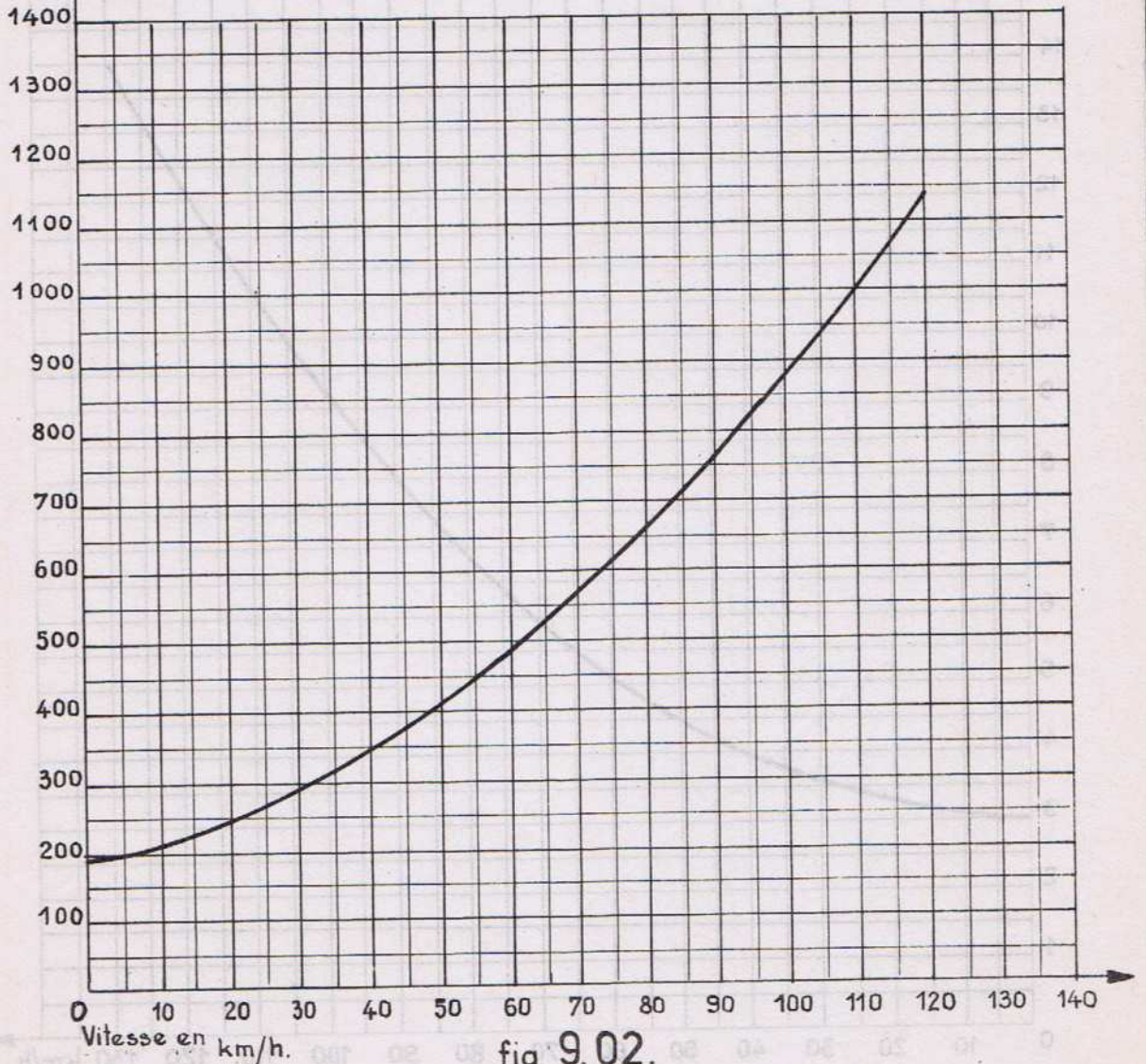


fig 9.02.

Courbes caractéristiques

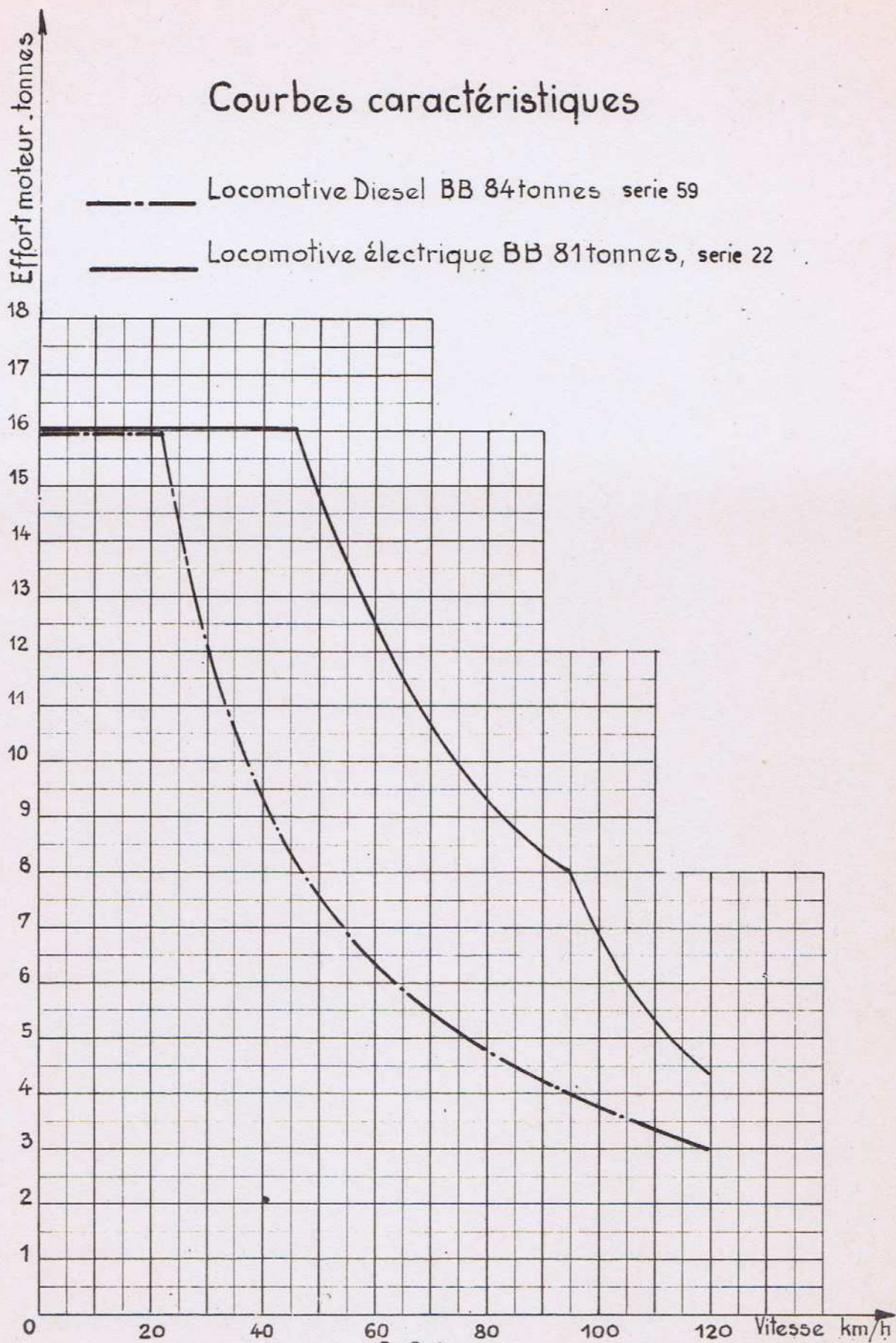


fig. 9.04.

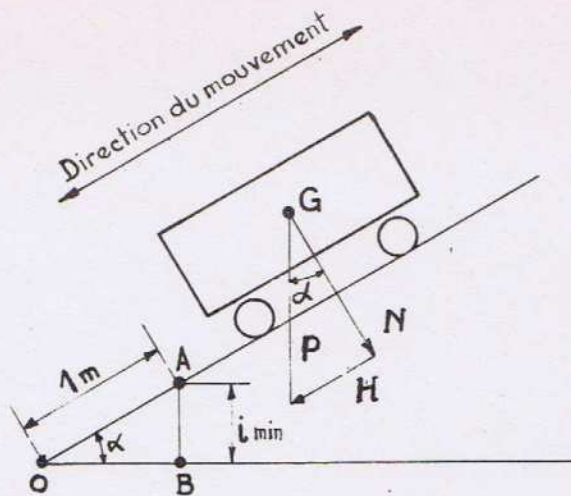


fig. 10. 01.

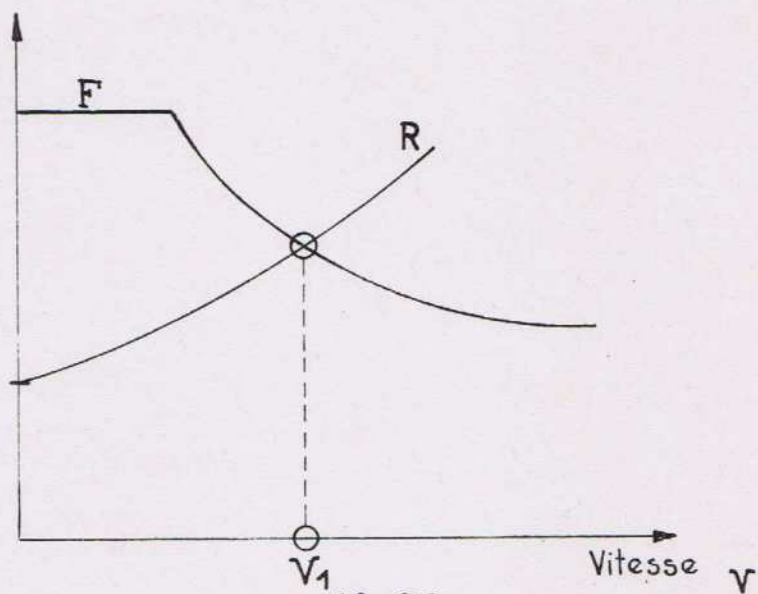


fig. 10. 02.

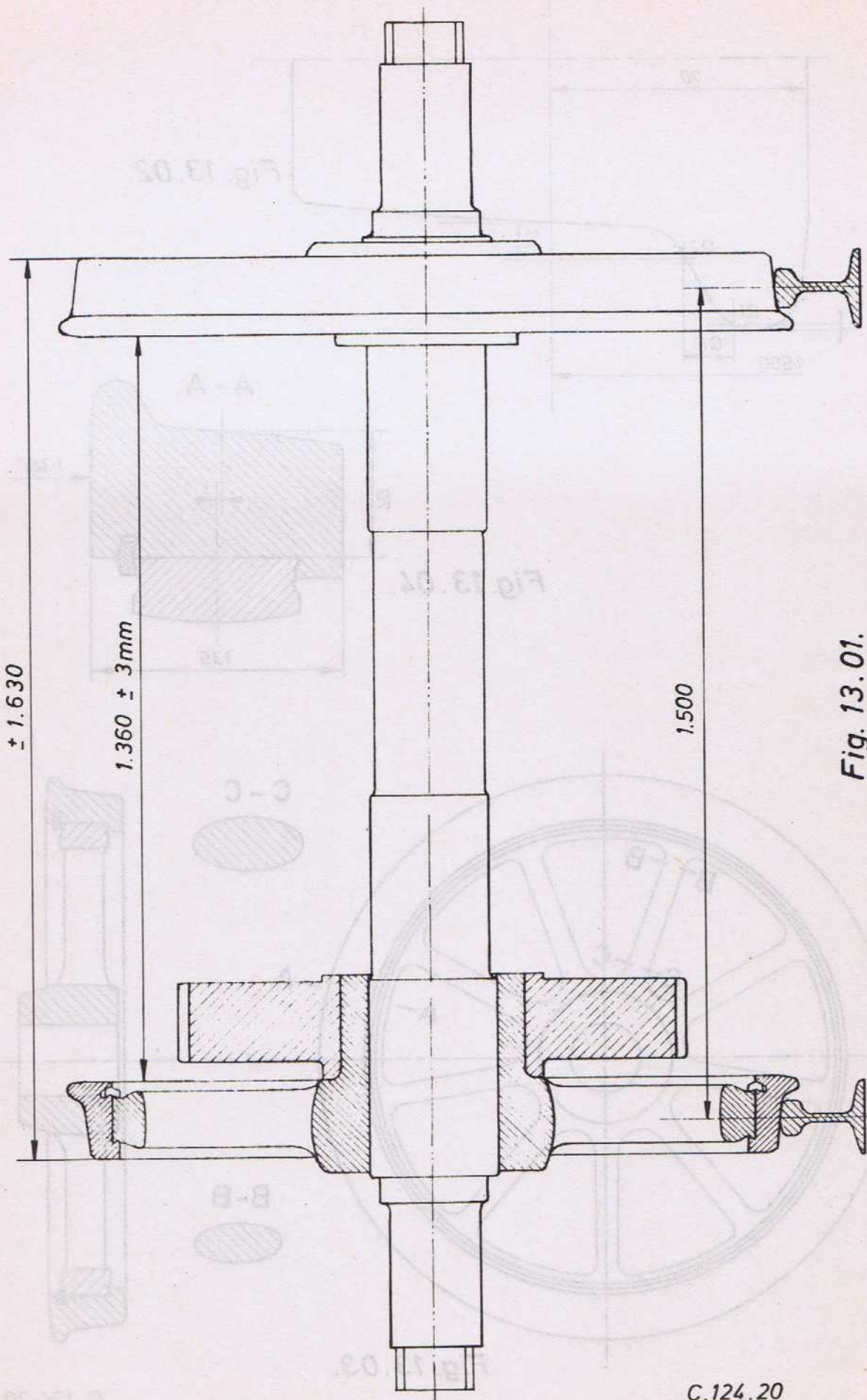


Fig. 13.01.

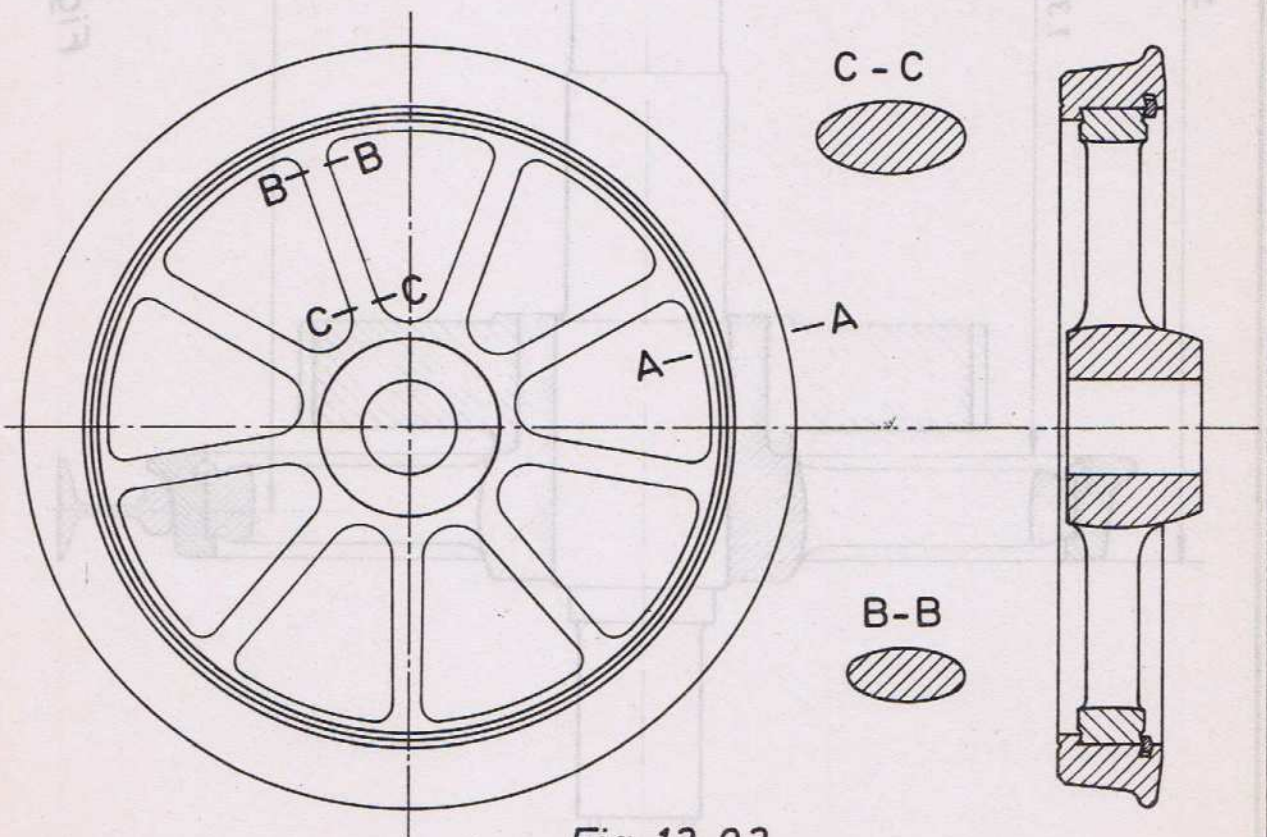
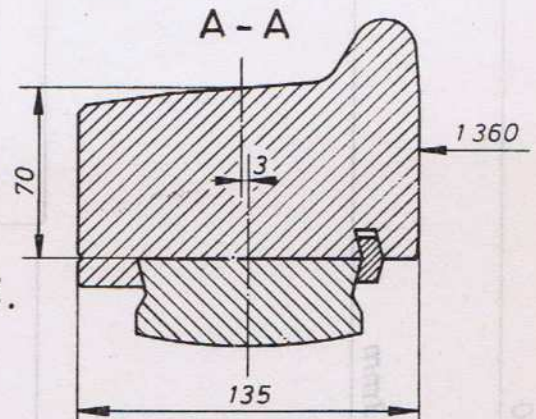
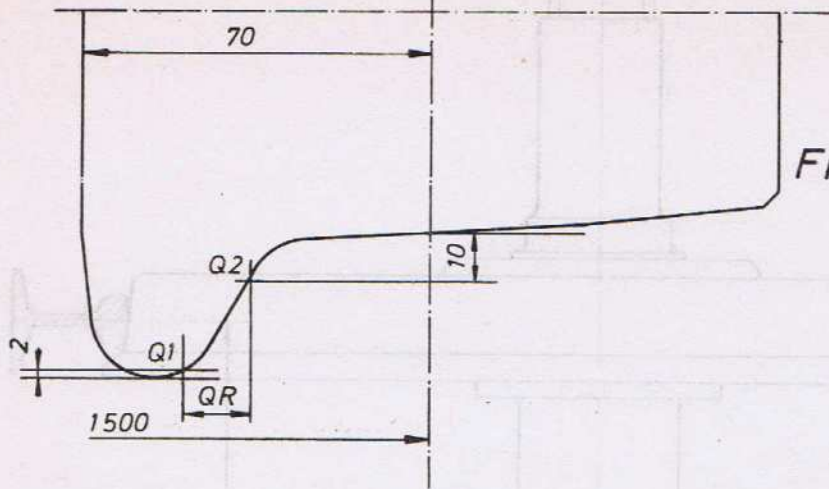


Fig. 13.03.

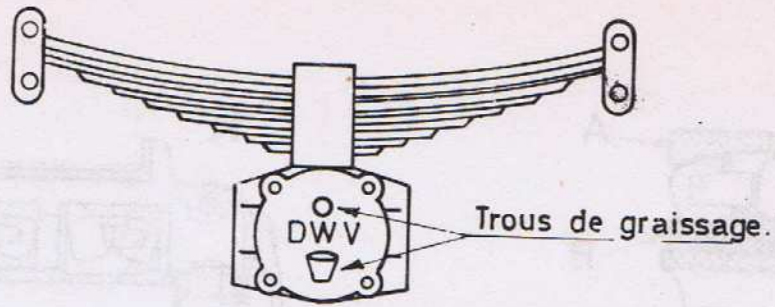


Fig. 13.05.

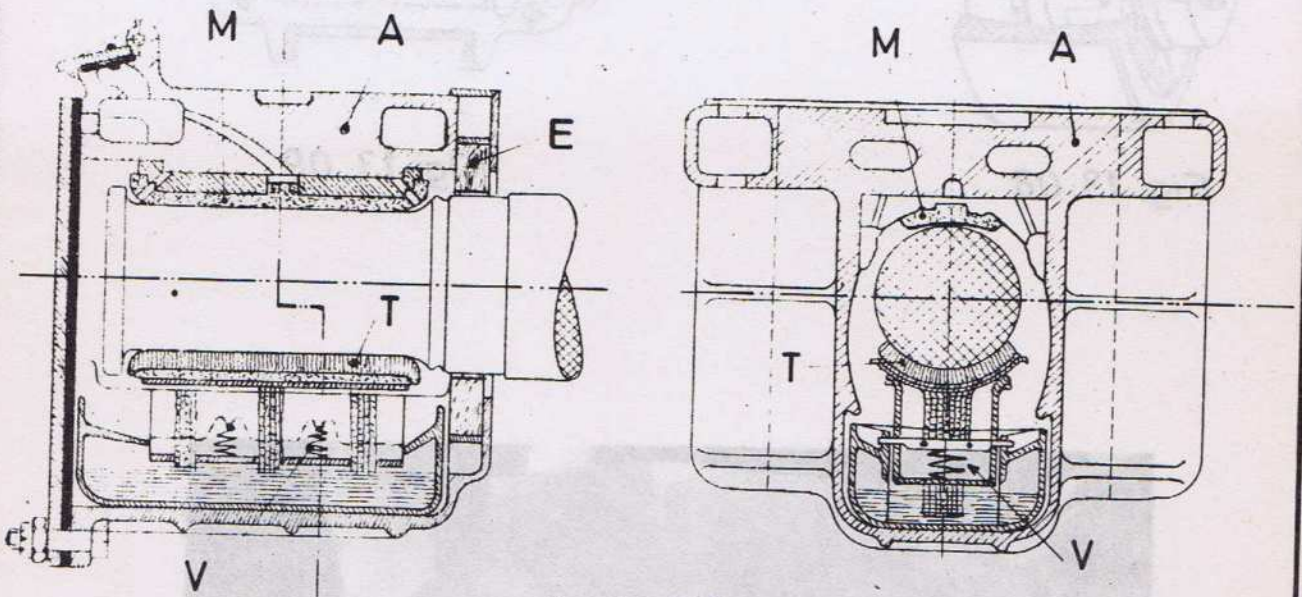


Fig. 13.06.

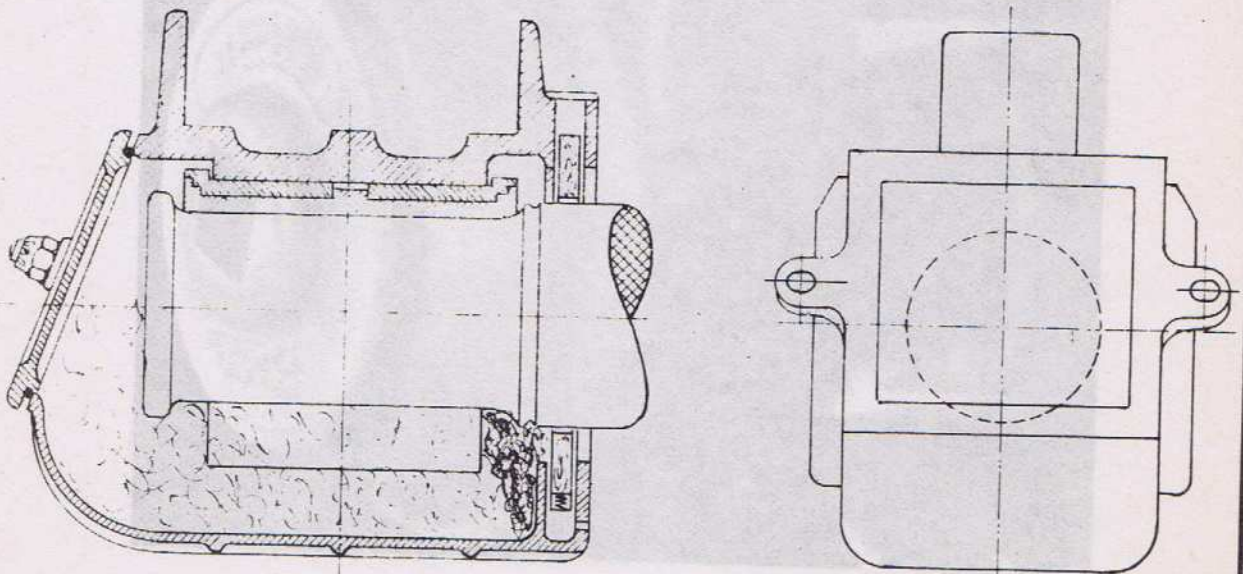


Fig. 13.07.

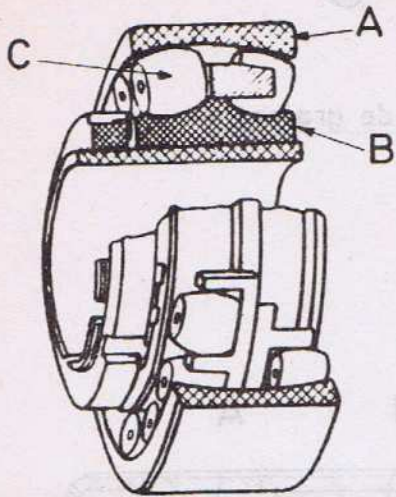


Fig. 13.08.

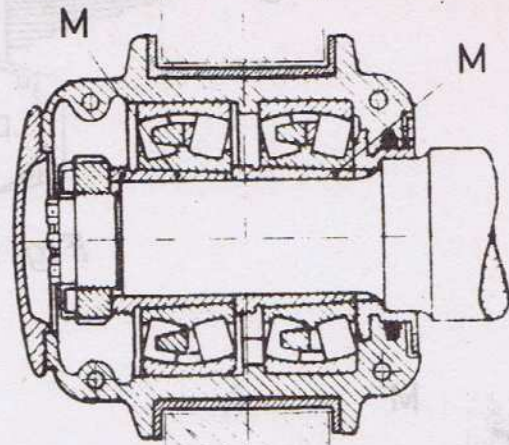


Fig. 13.09.

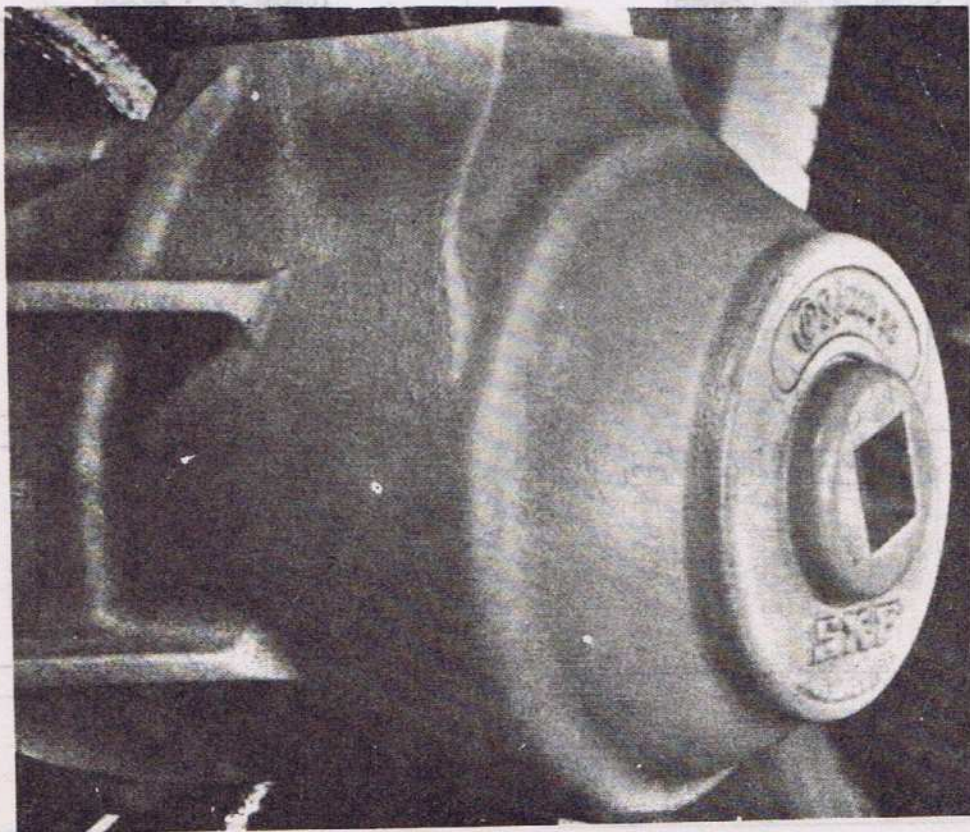


Fig. 13.10.

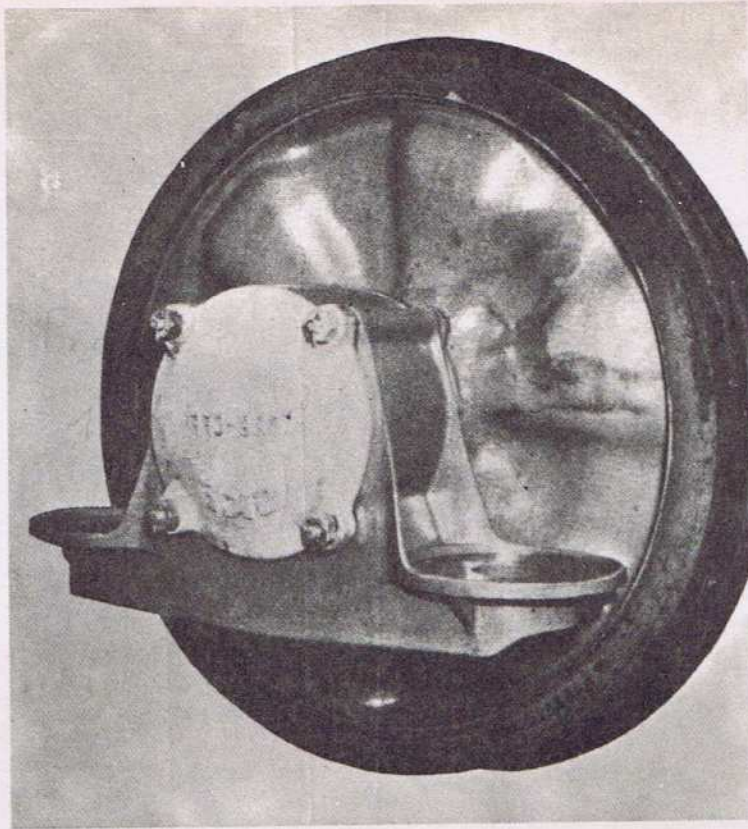
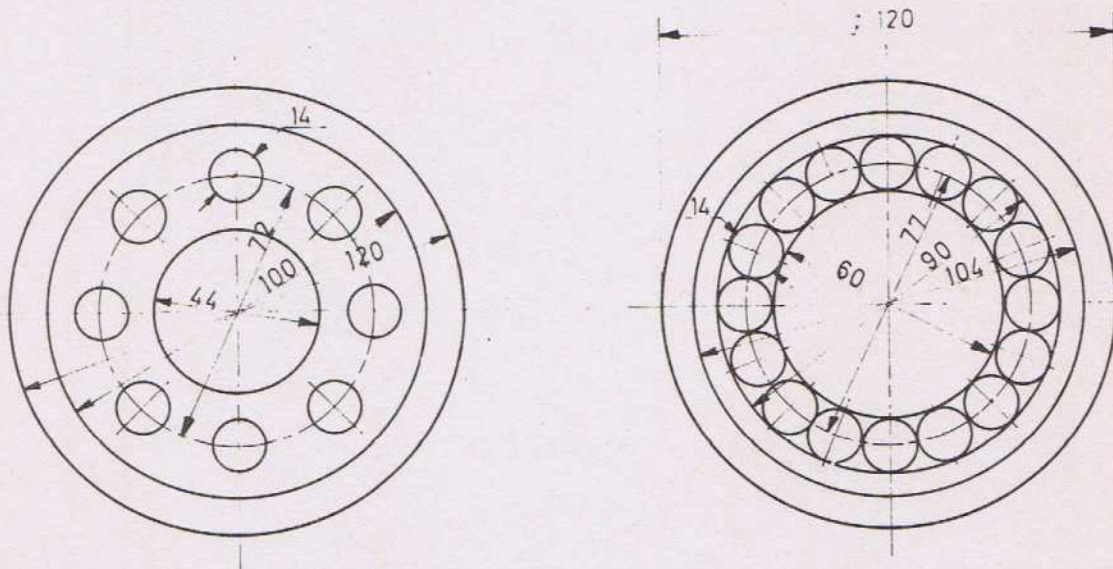


Fig. 13.11.

Réseaux F.S./S.N.C.B.

Réseau S.N.C.F.



Les deux marques sont peintes en blanc avec le centre peint entièrement en blanc.

Fig. 13.12.

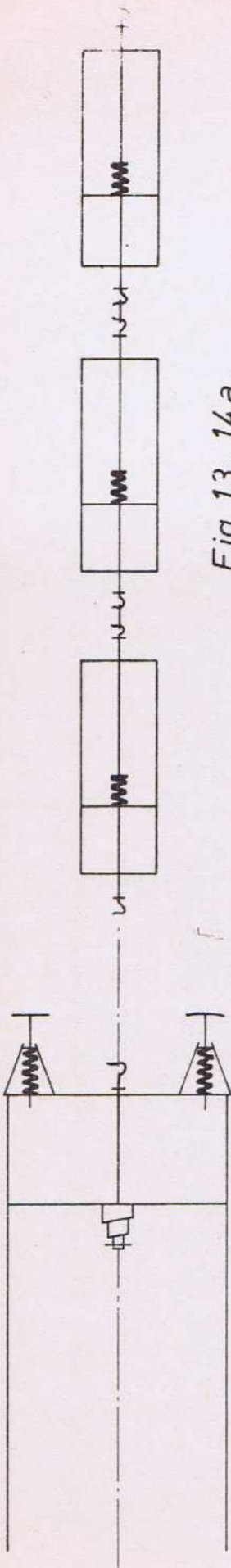


Fig. 13.13a.

Fig. 13.14a.

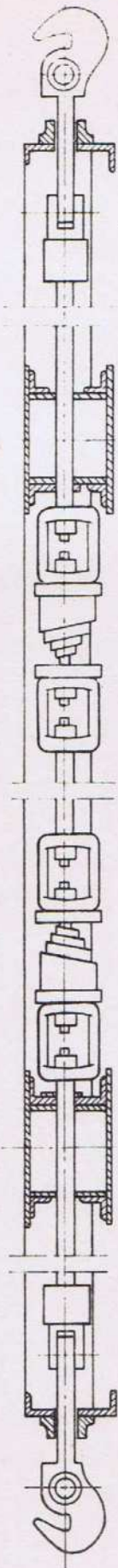


Fig. 13.14b.

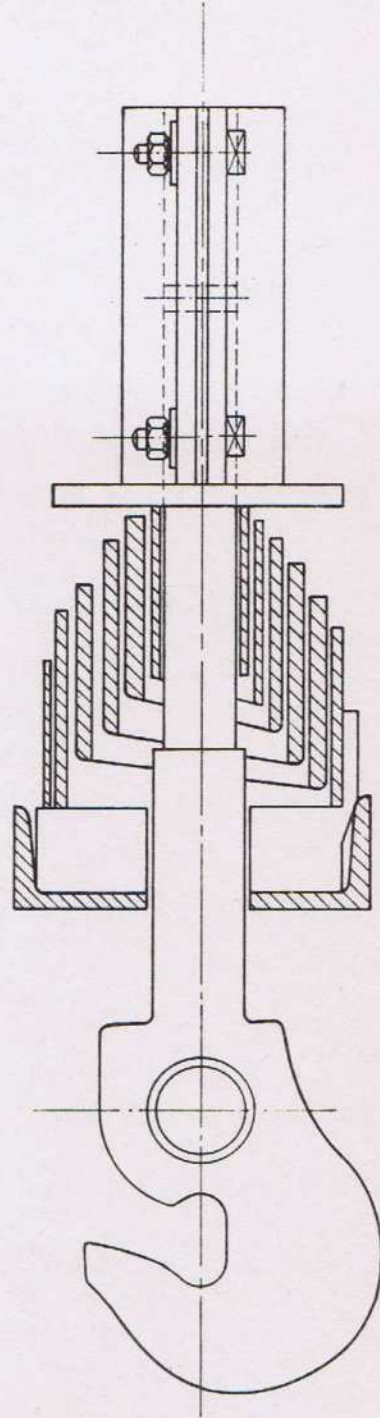


Fig. 13.13b.

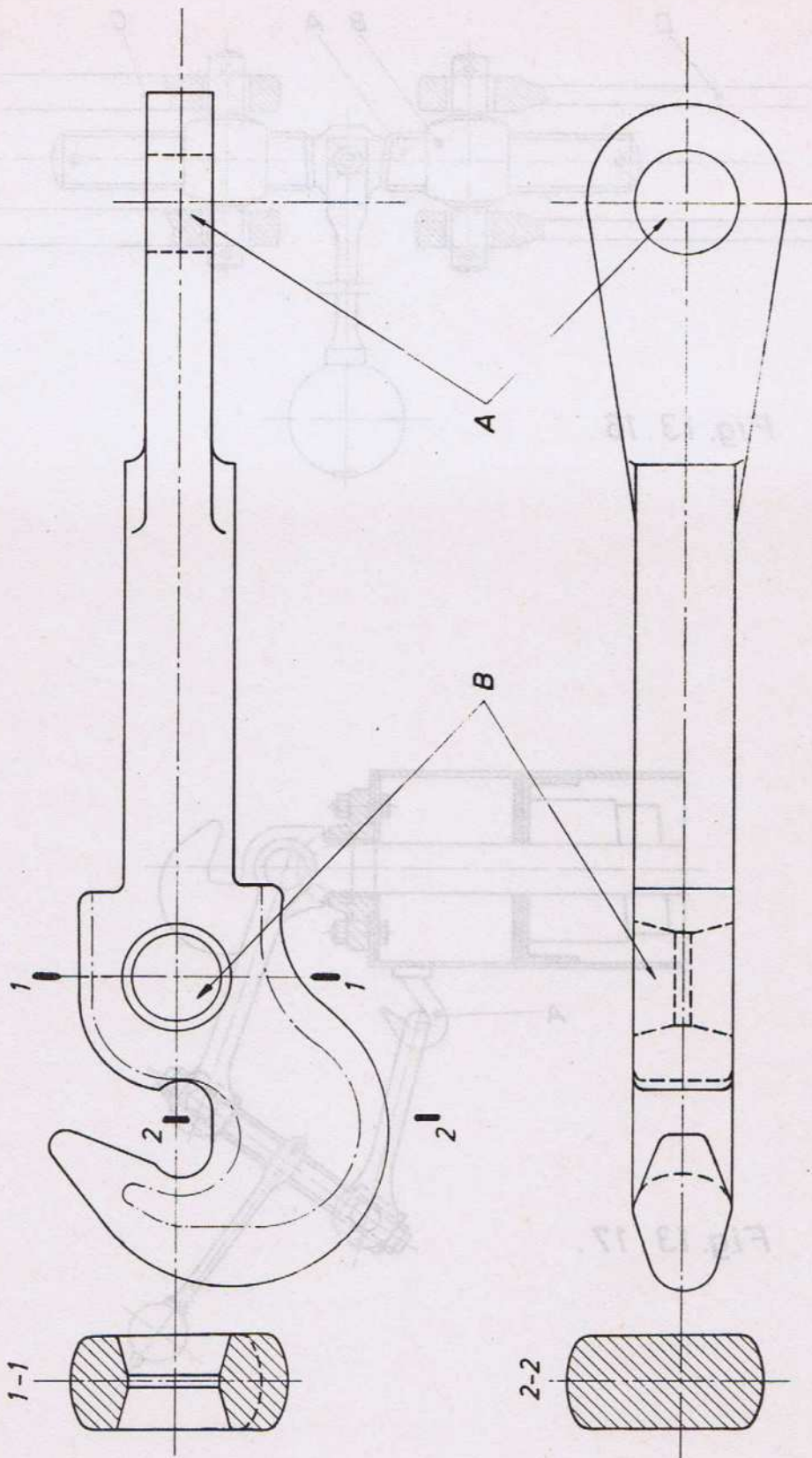


Fig. 13.15.

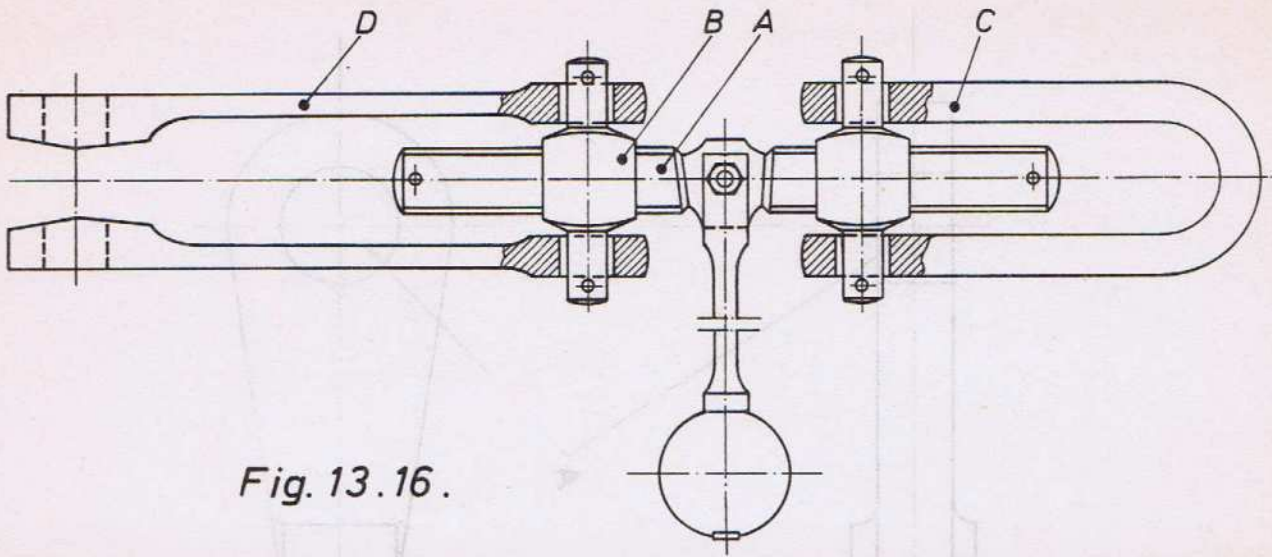


Fig. 13.16.

Fig 13.12

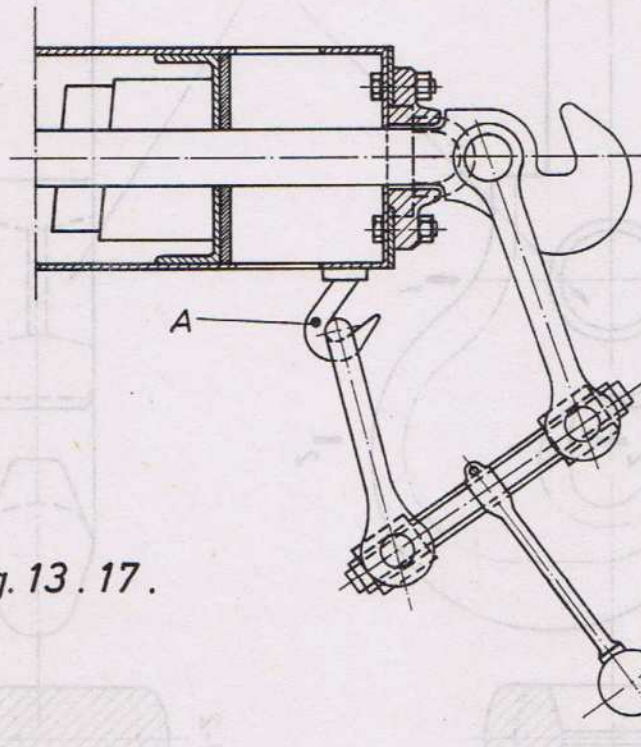


Fig. 13.17.

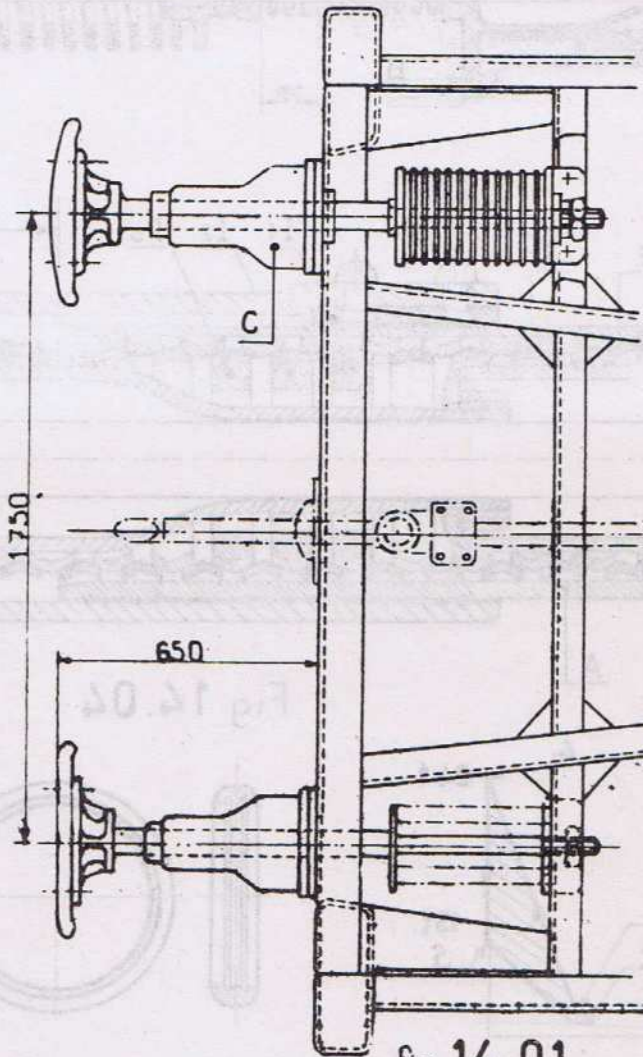
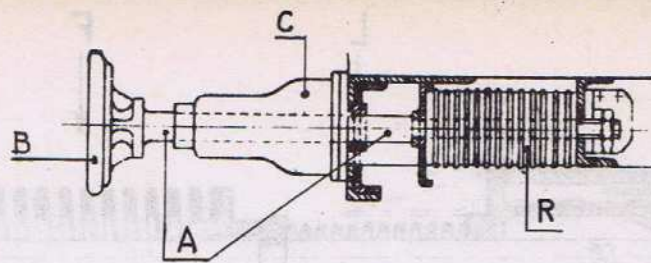


fig. 14.01

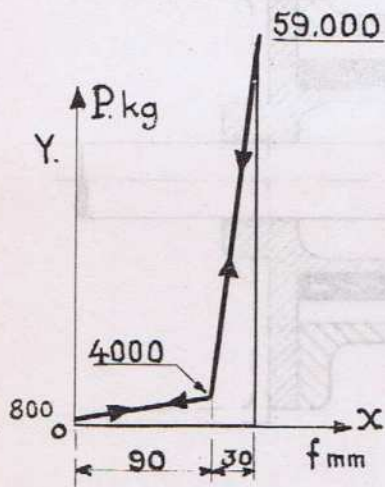


fig. 14.03

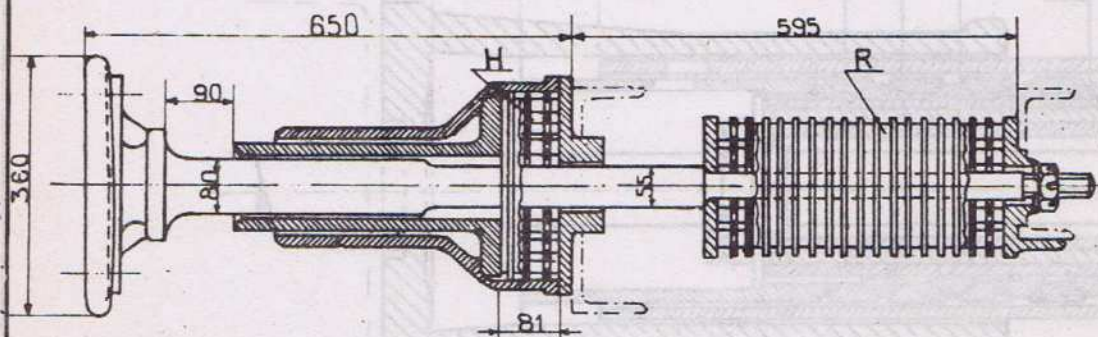


fig. 14.02

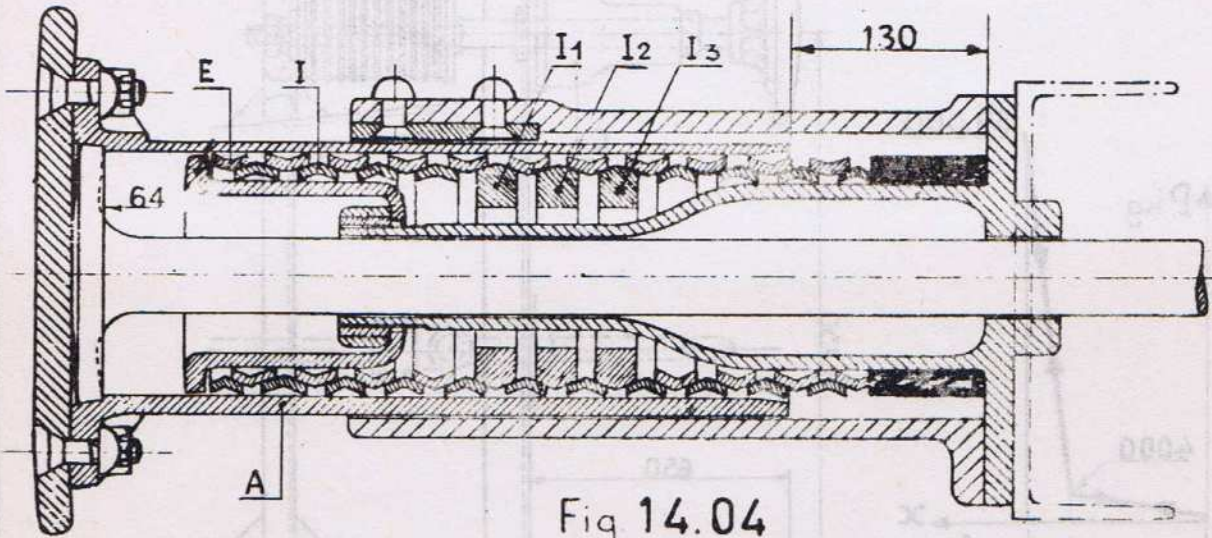
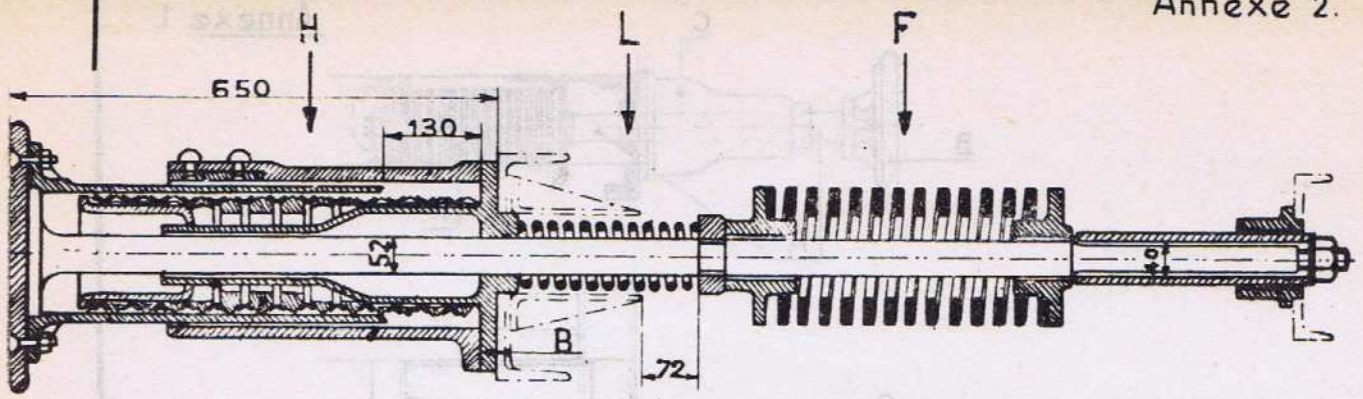


Fig 14.04

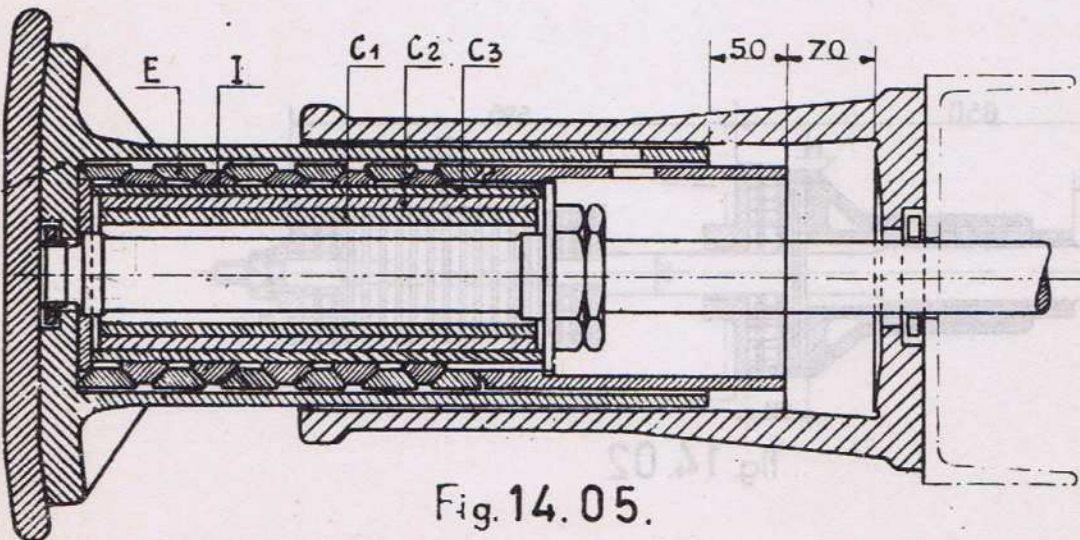
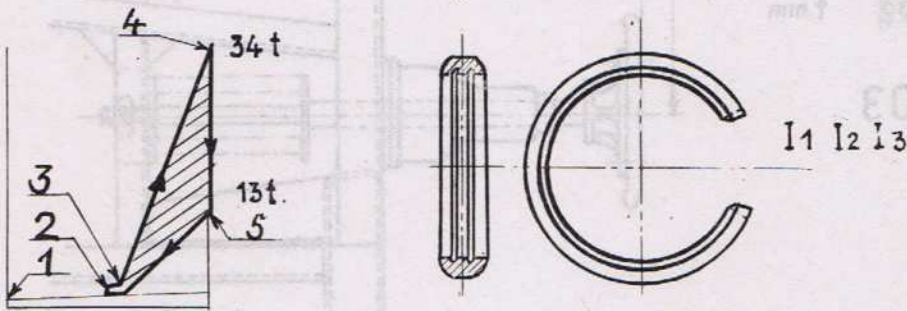


Fig. 14.05.

C 1.2.3

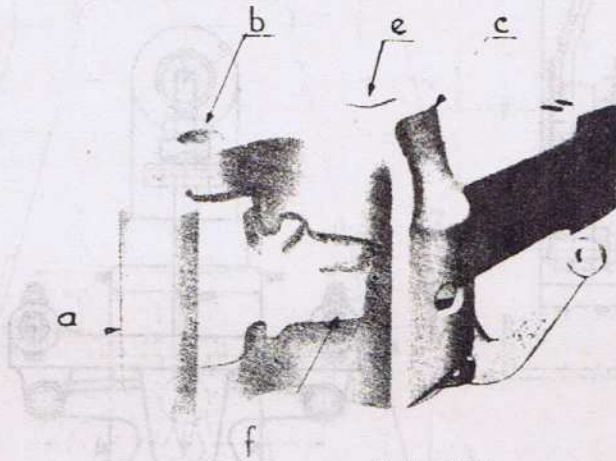
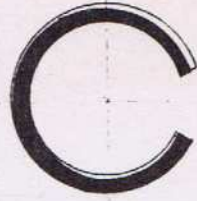
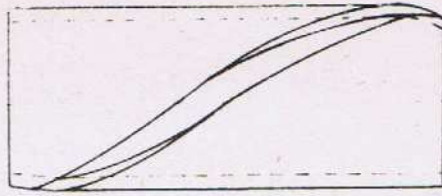


fig. 14.06

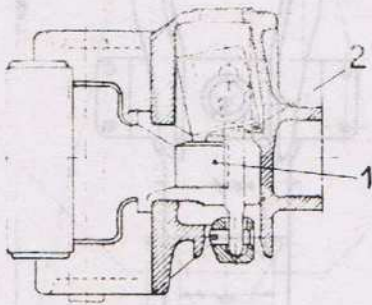


fig 14.07

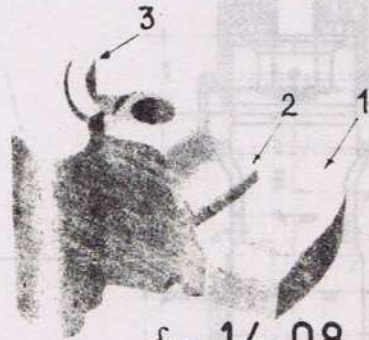


fig. 14.08

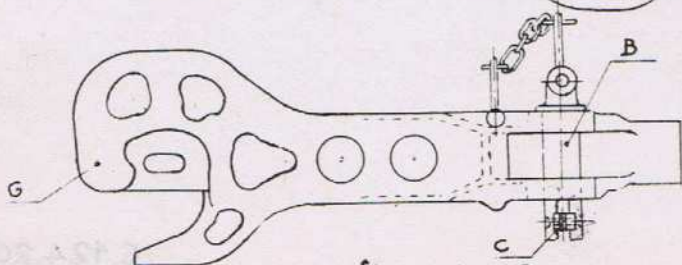
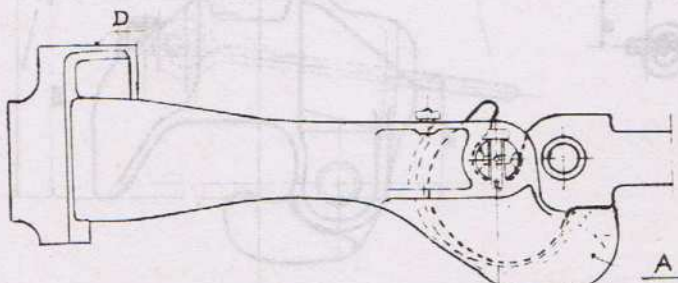


fig. 14.10

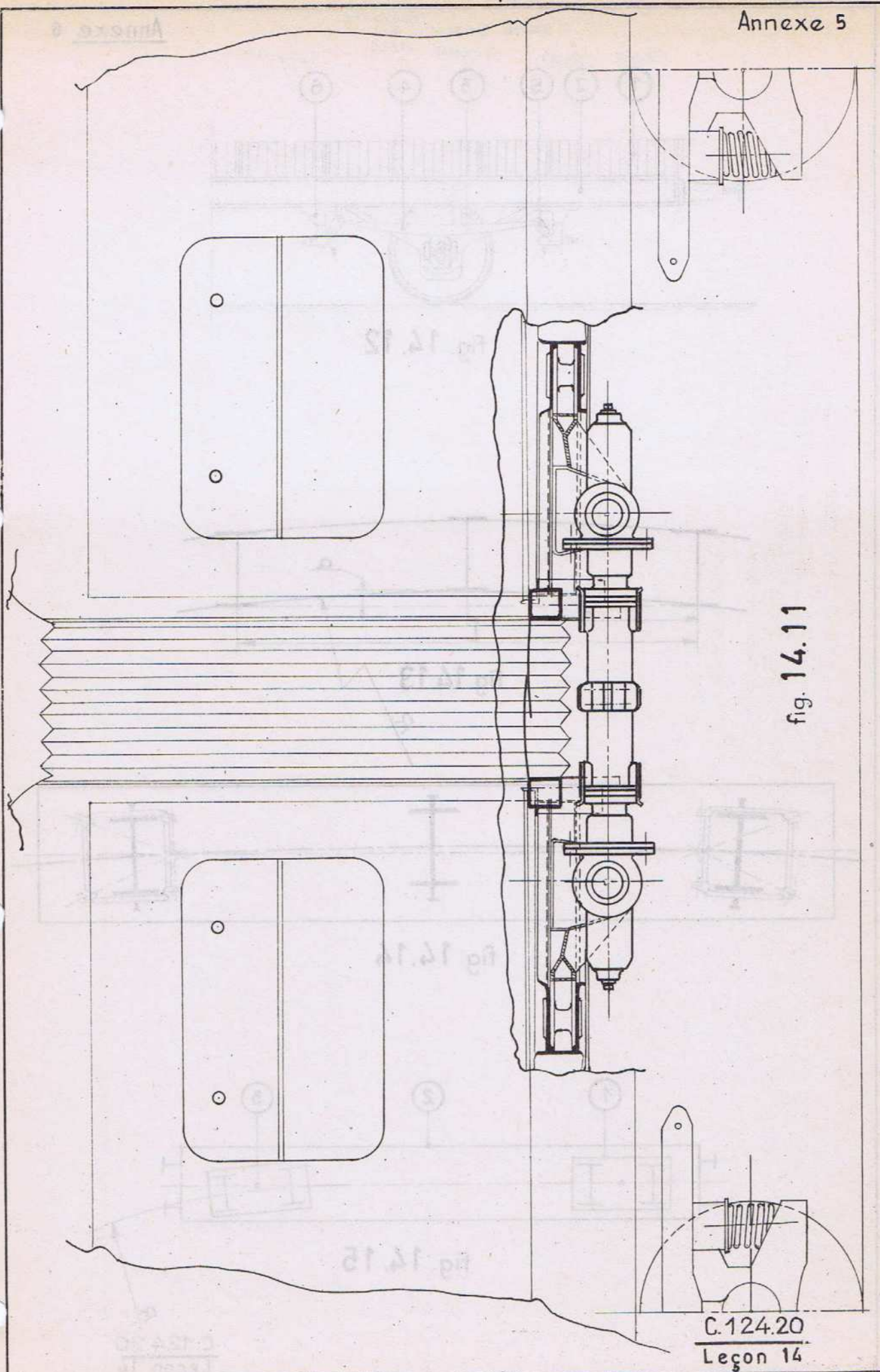


fig. 14.11

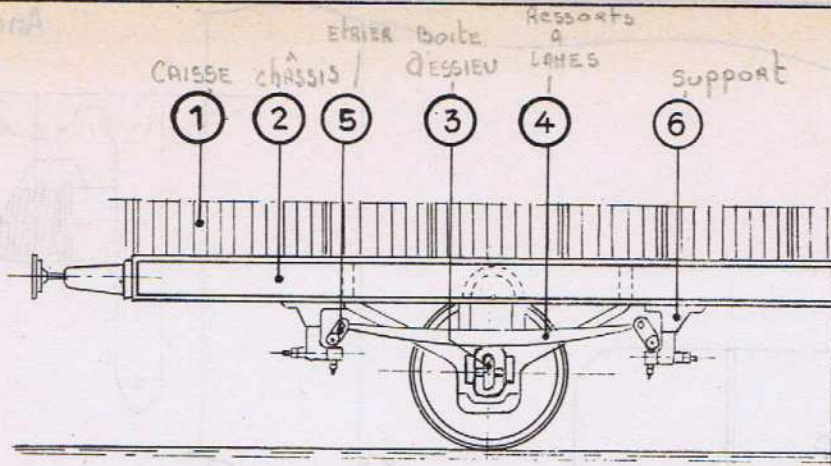


fig. 14.12

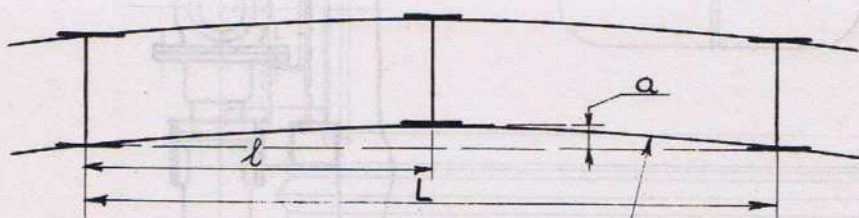


fig. 14.13

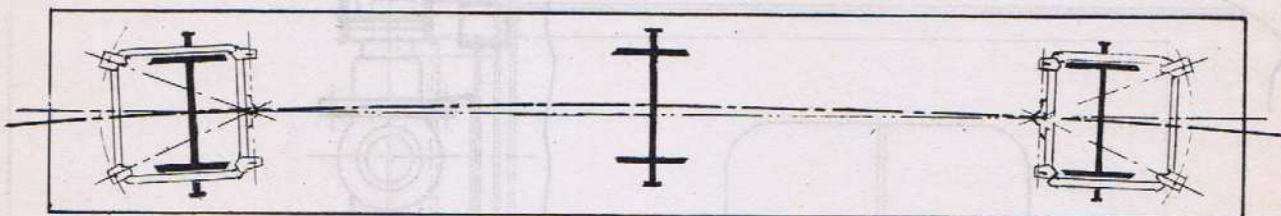


fig. 14.14

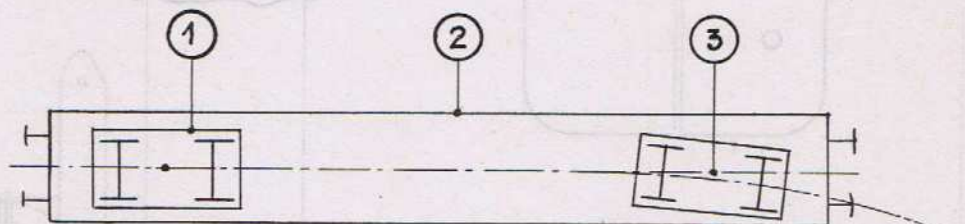


fig. 14.15

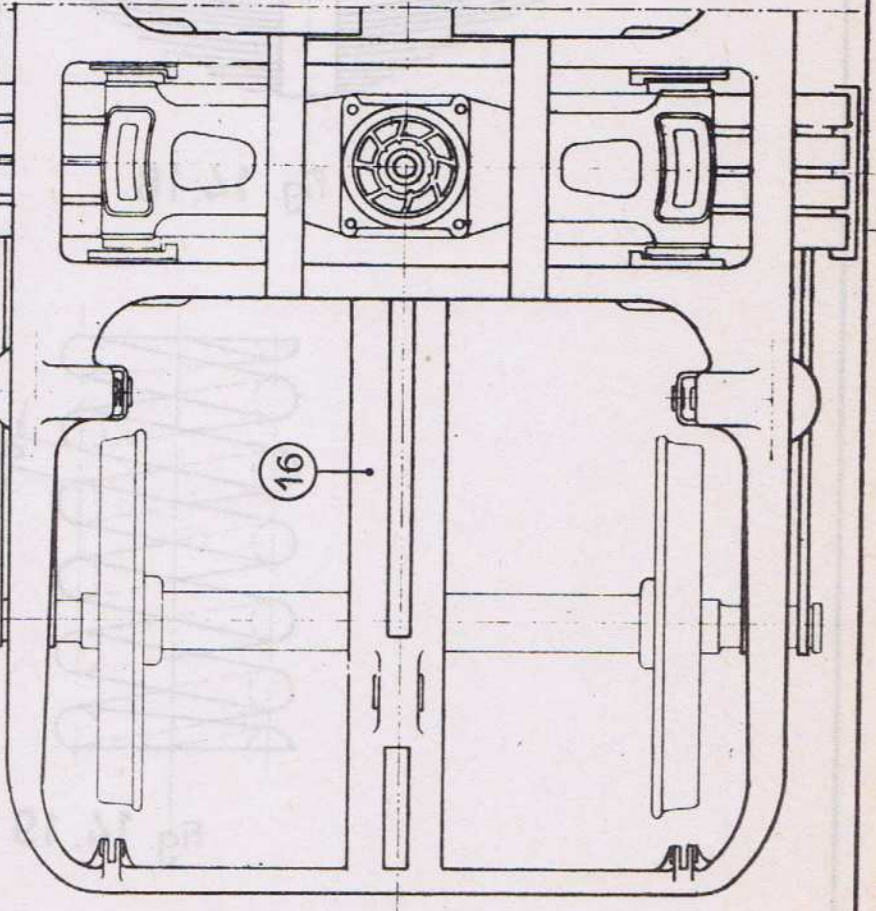
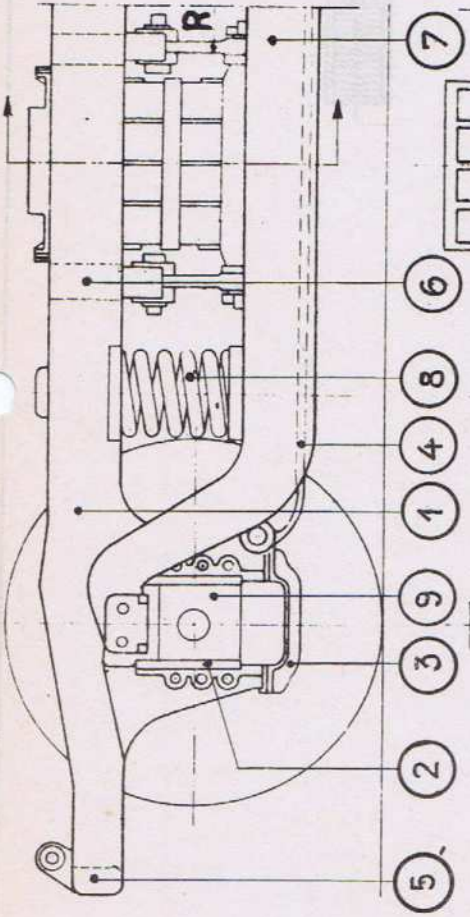
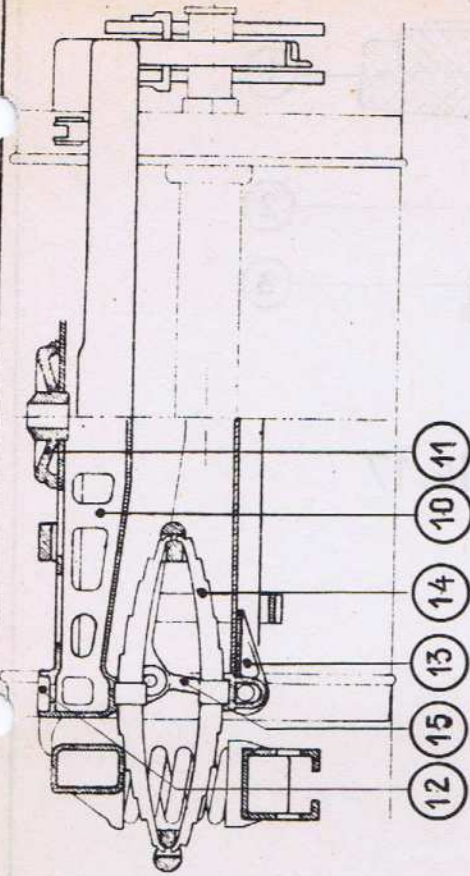


fig. 14.16

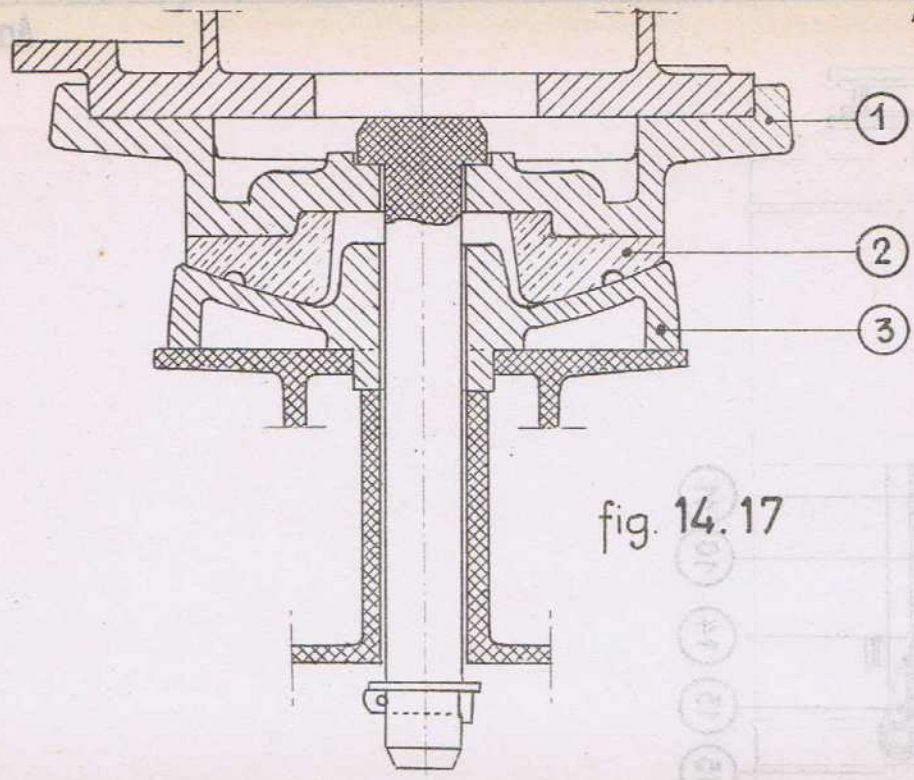


fig. 14.17

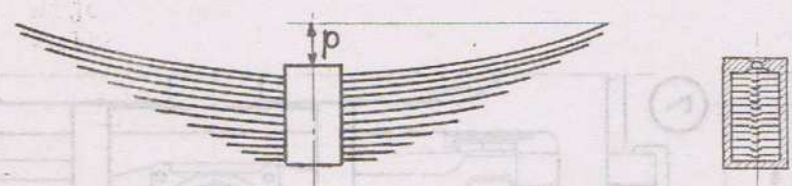


fig. 14.18

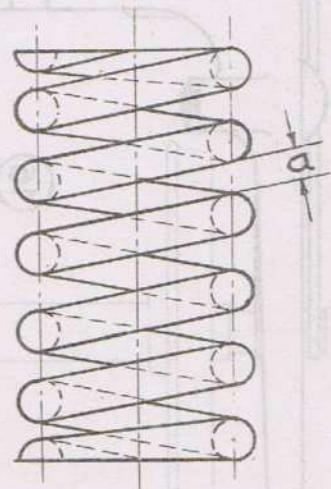
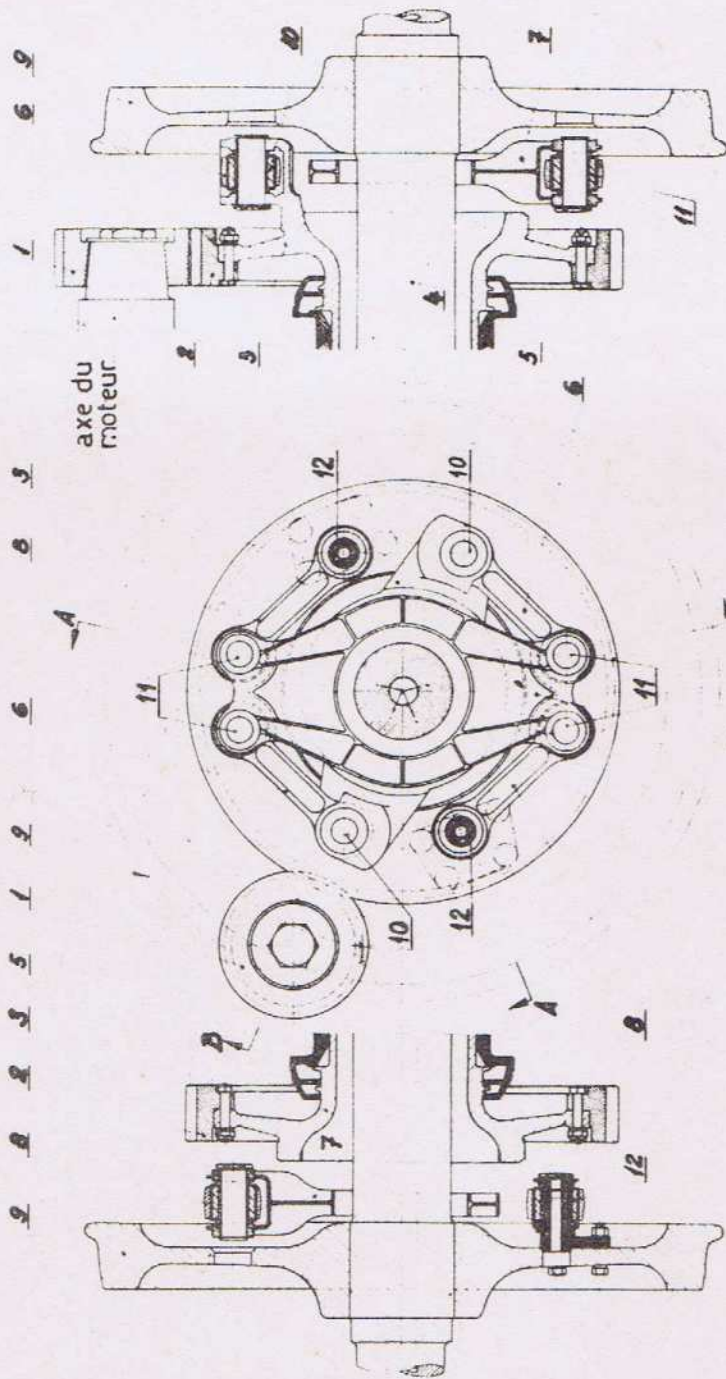


fig. 14.19



Coupe AA

Coupe BB

Fig 15.01

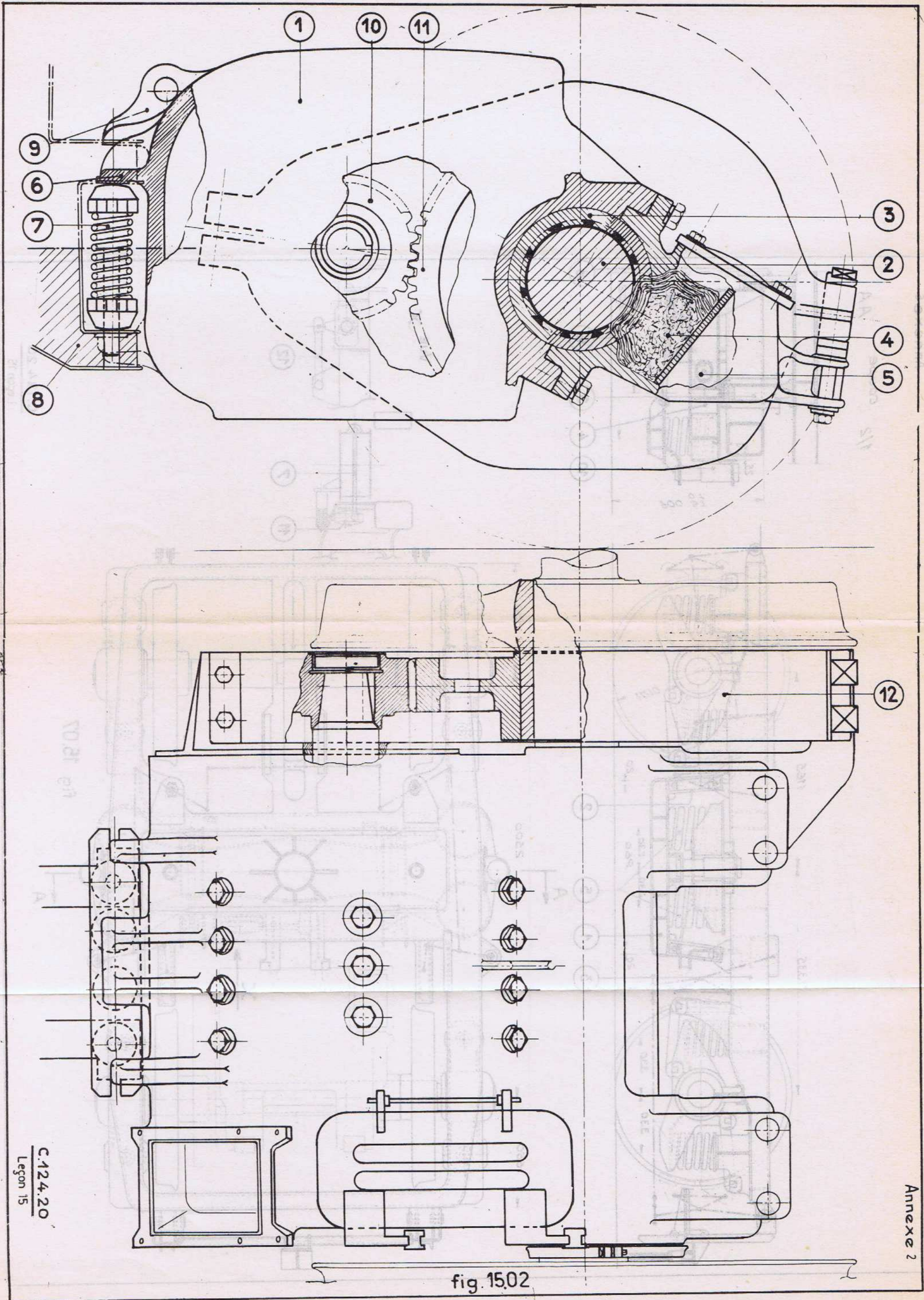


fig. 15.02

C.124.20
Legon 15

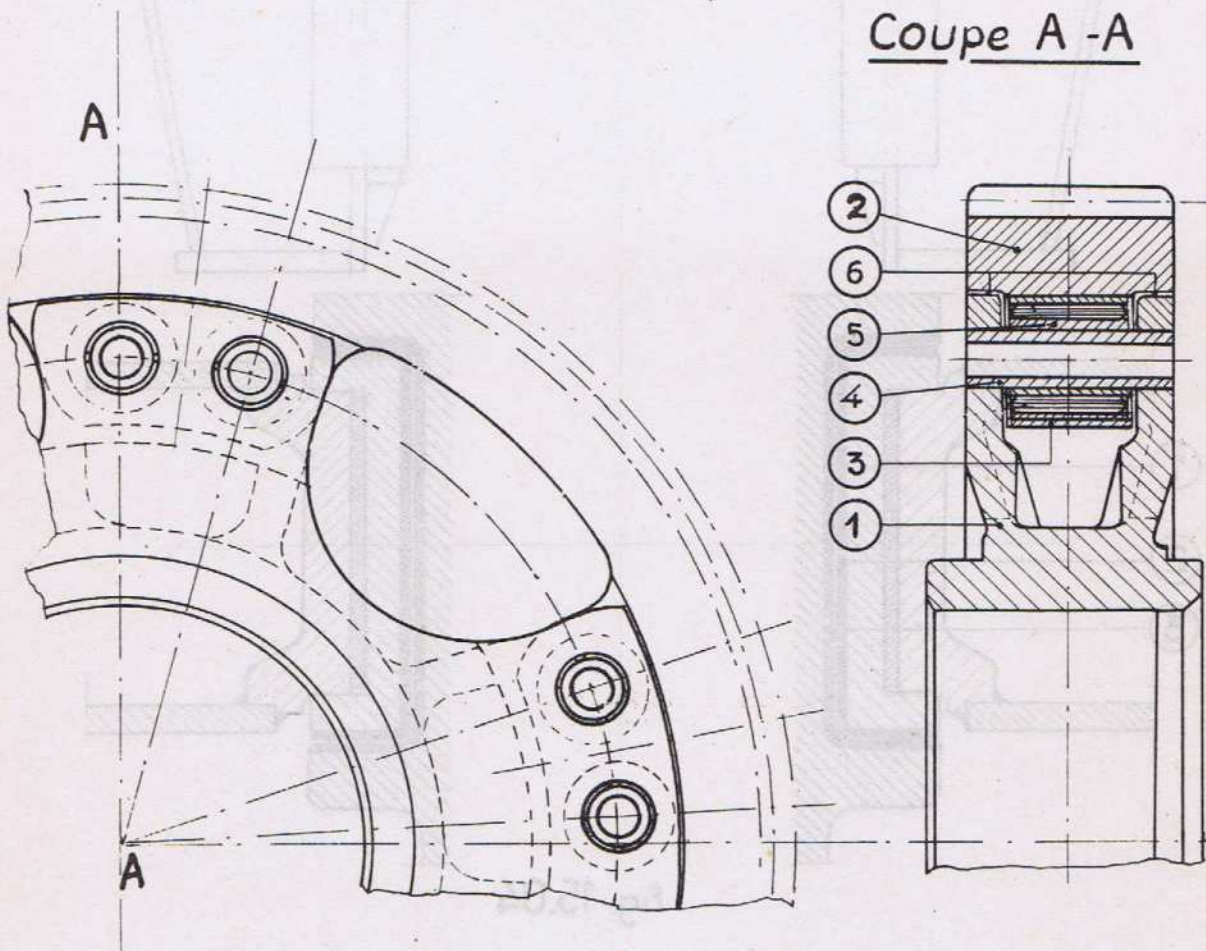


fig. 15.03

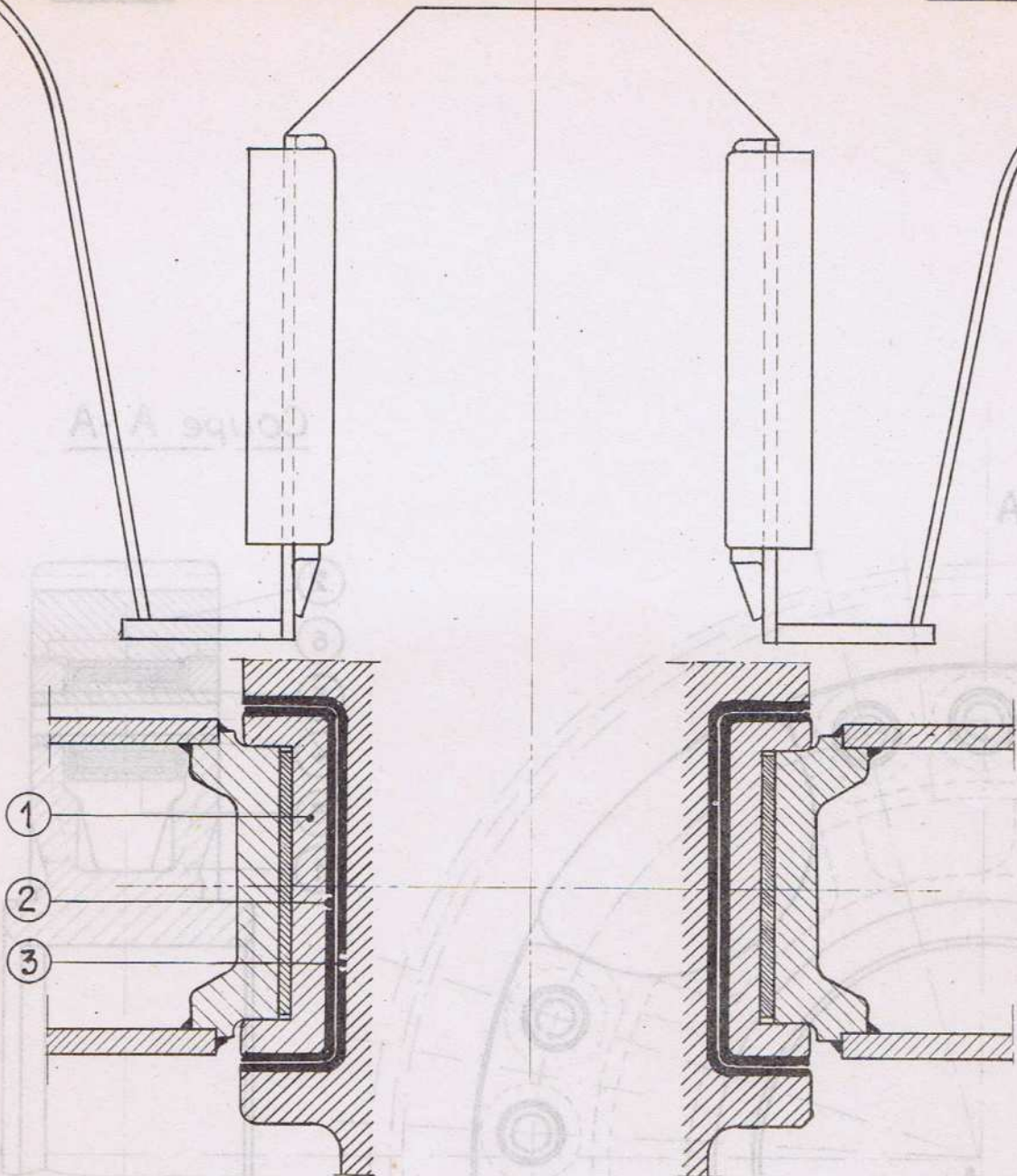


fig. 15.04

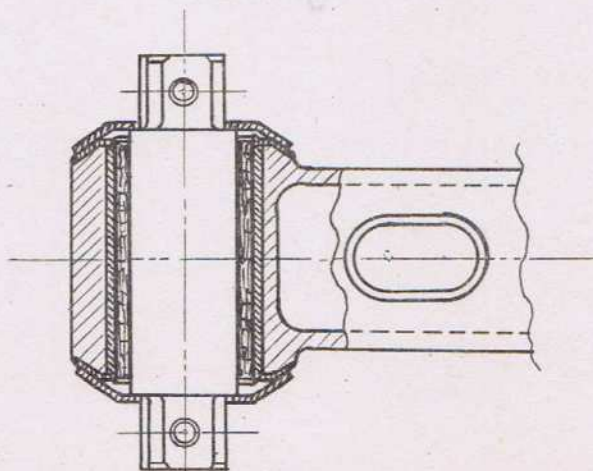


fig. 15.06

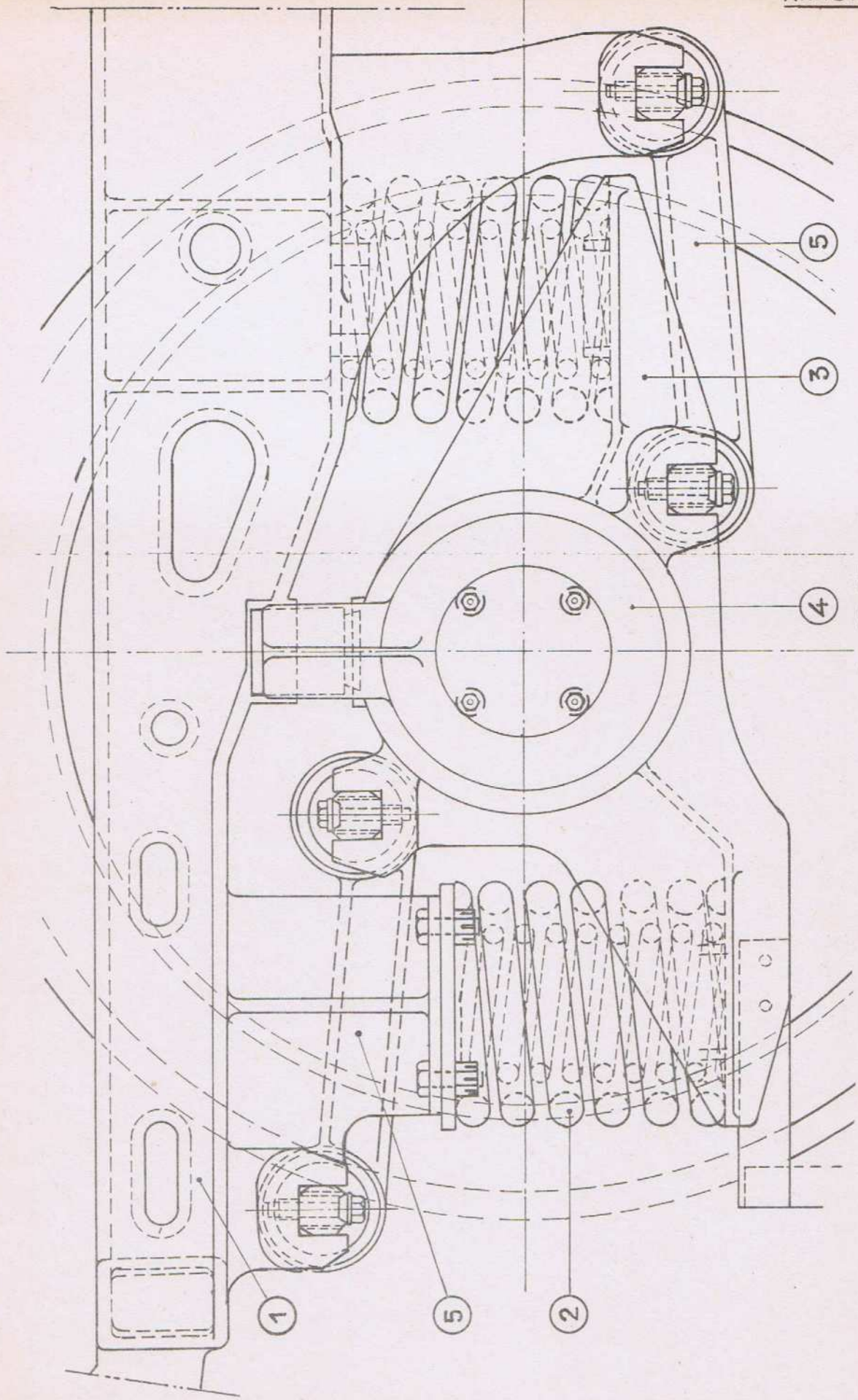


fig. 15.05

1/2 coupe AA

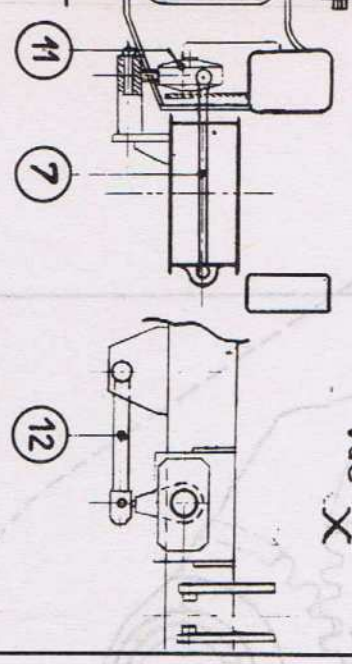
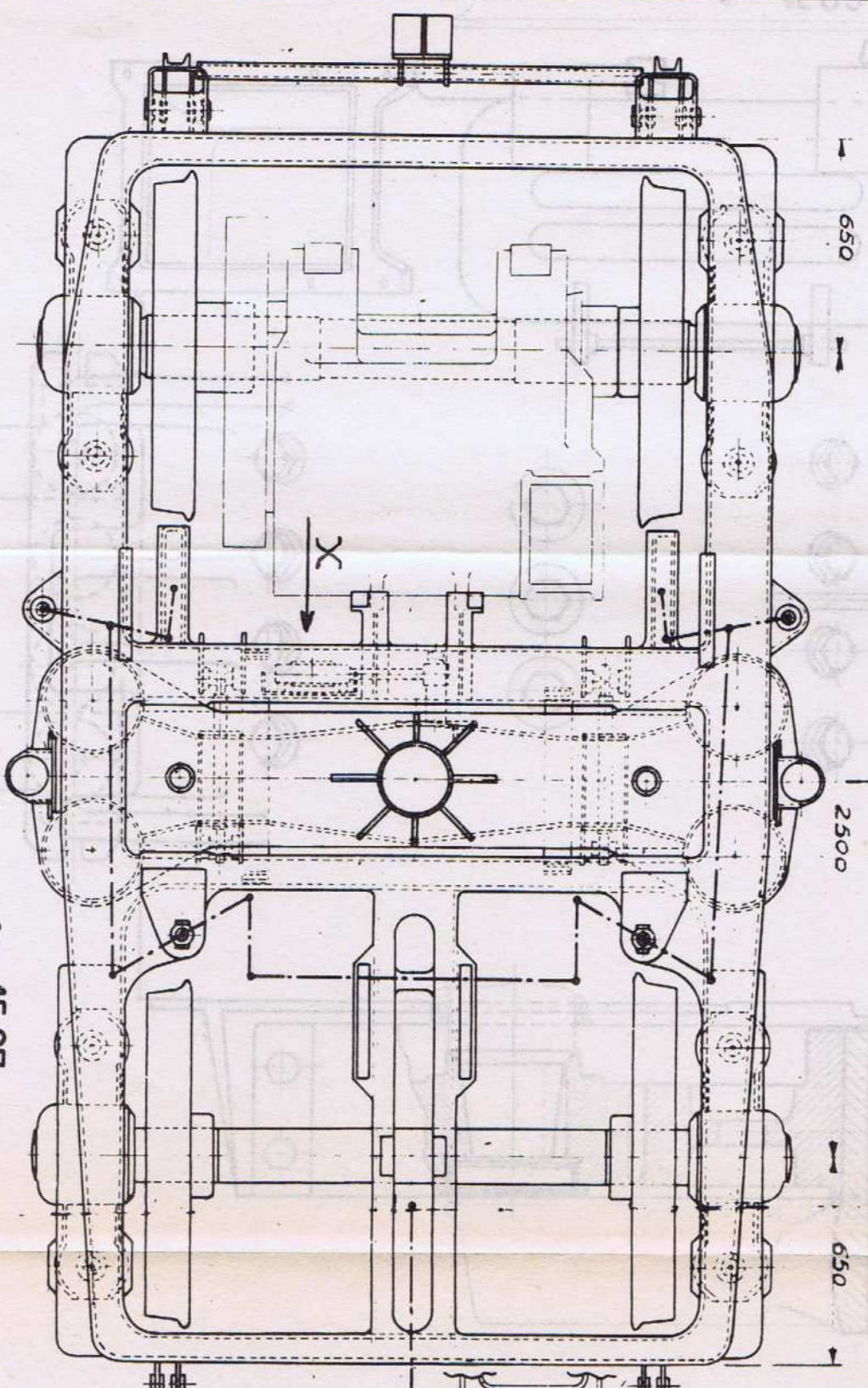
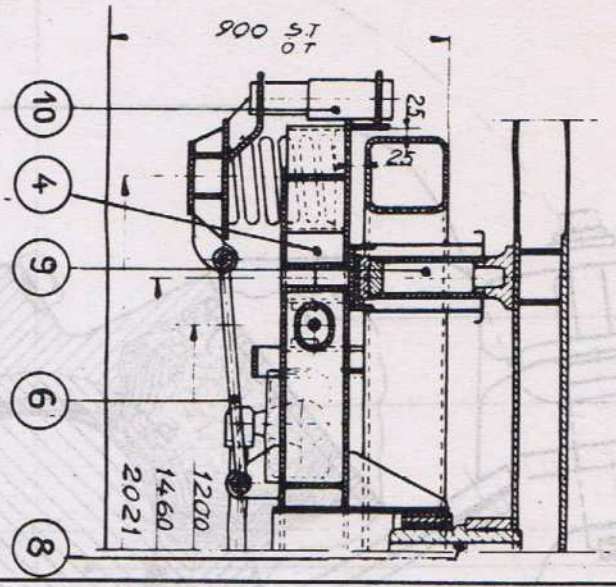
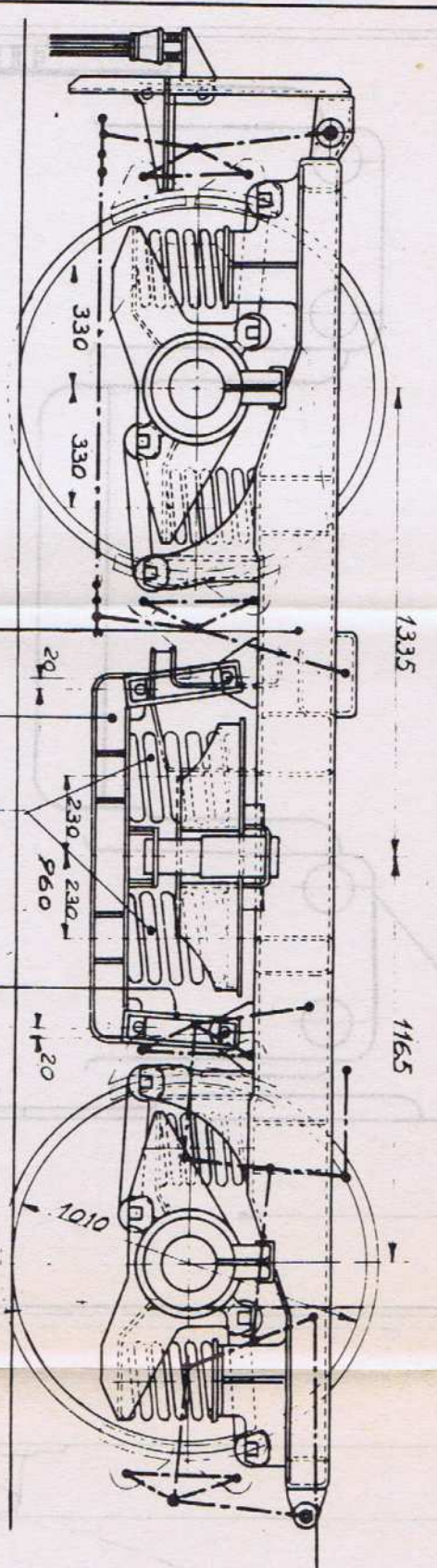


fig. 15.07

C.124.20
Léon 15

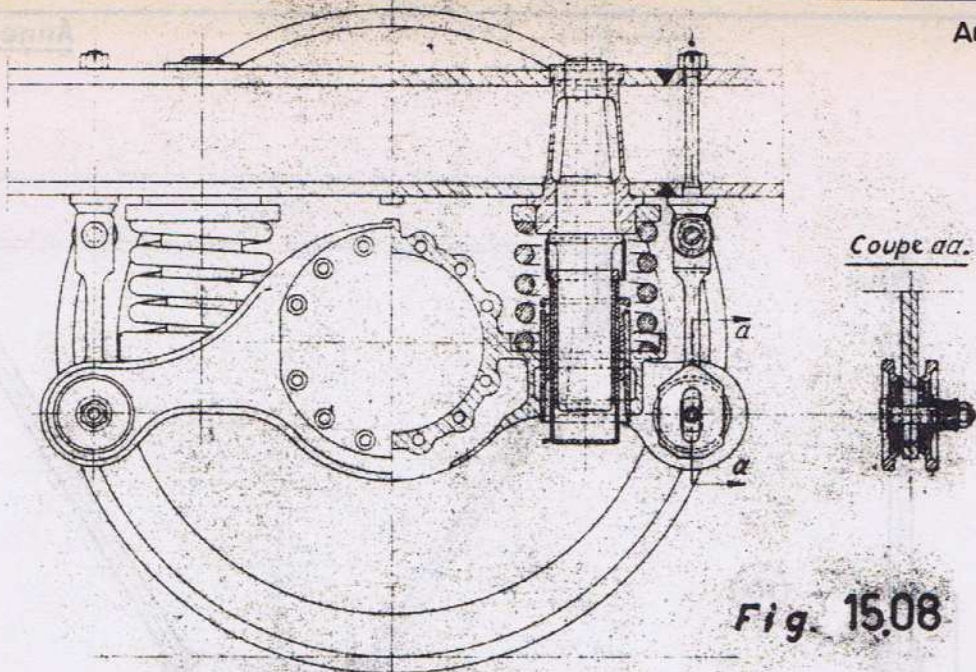


Fig. 15.08

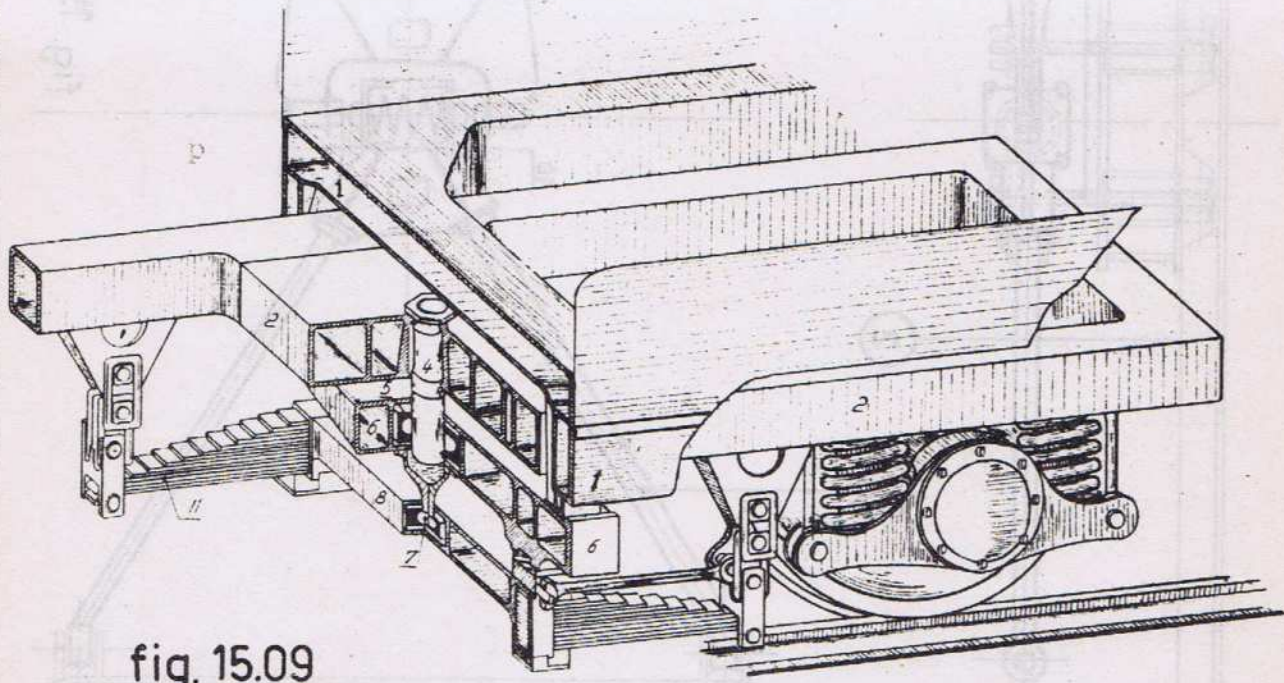
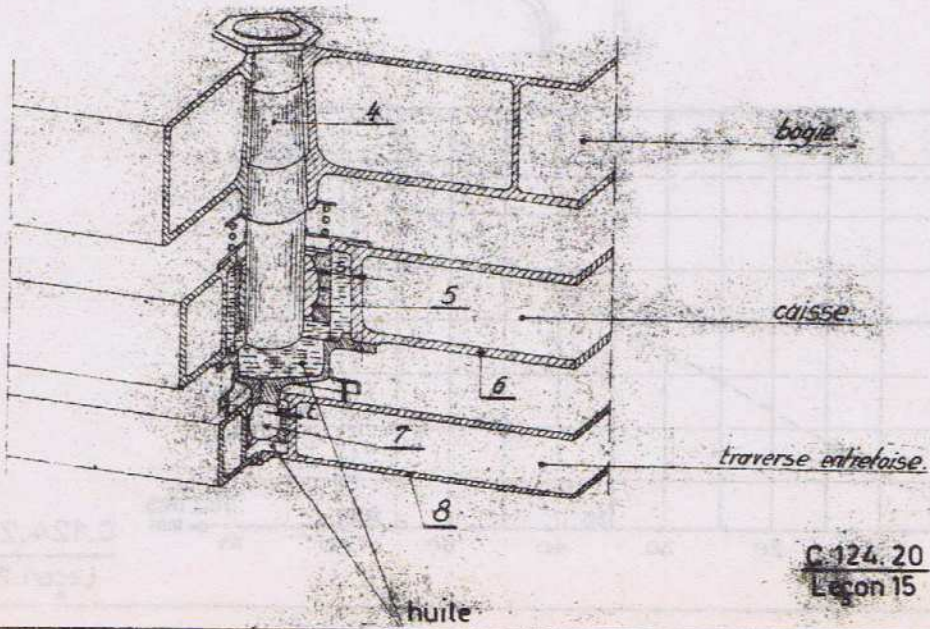


fig. 15.09



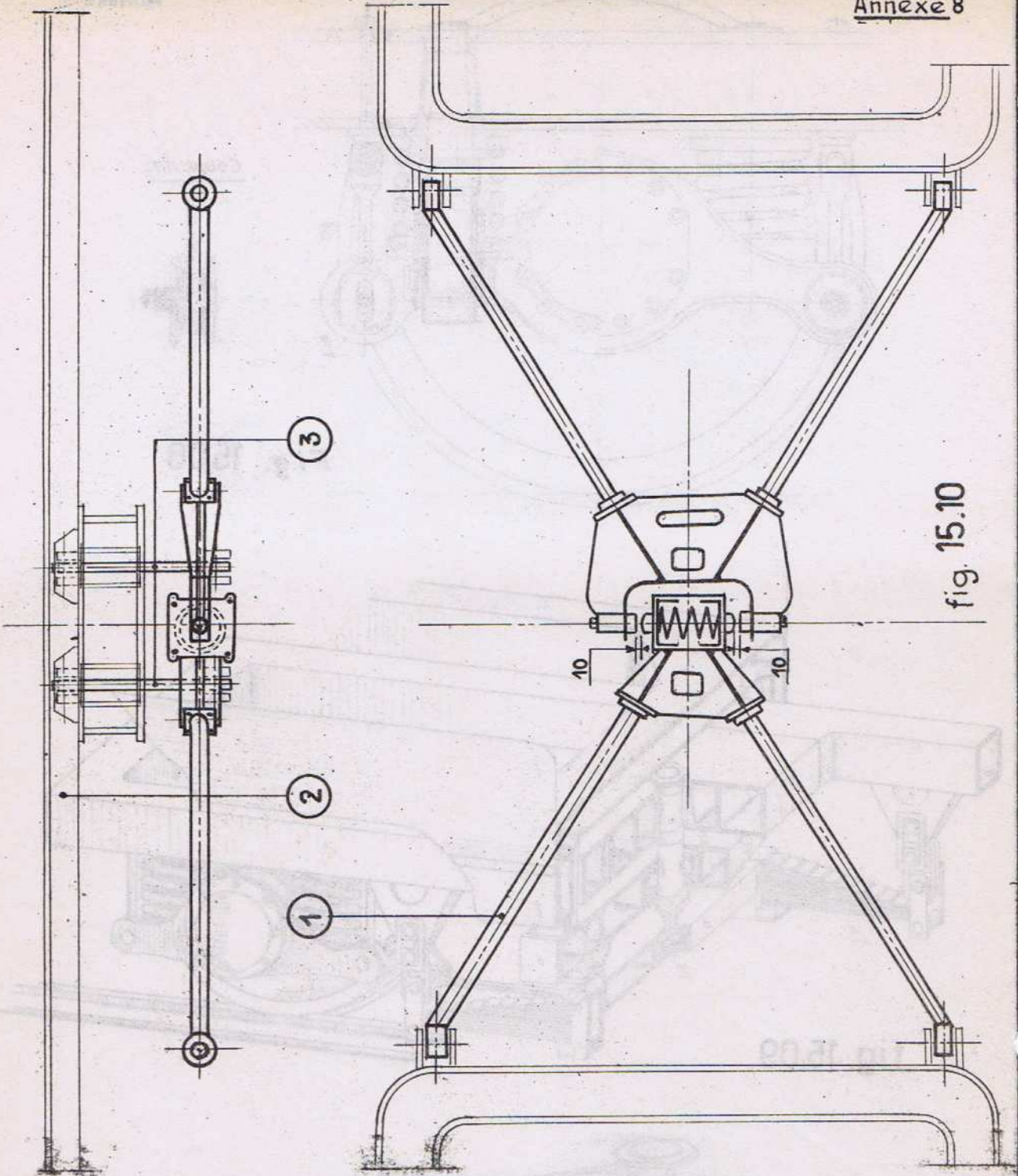
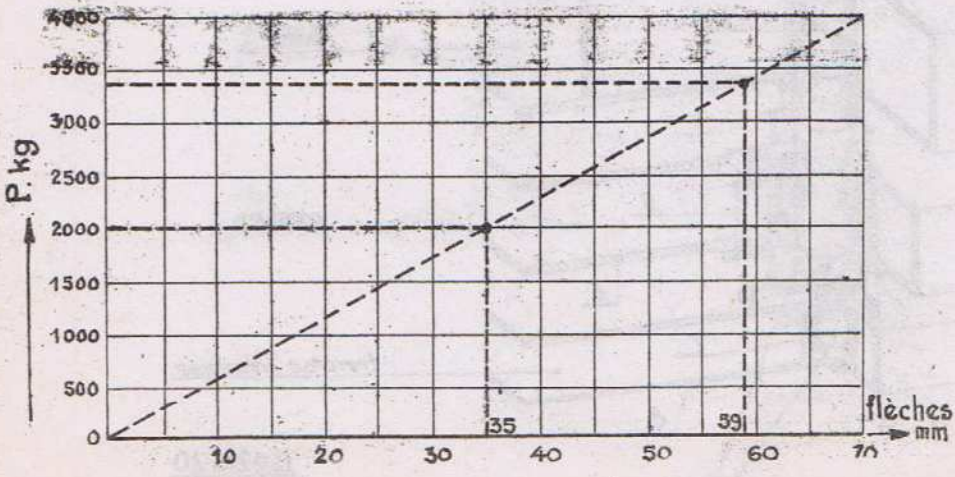


fig. 15.10



C.124.20
Leçon 15

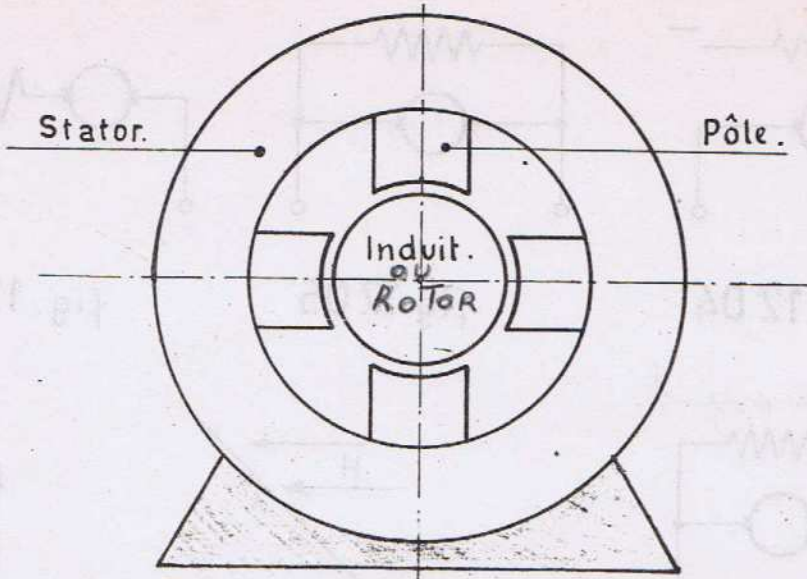


fig. 17.01

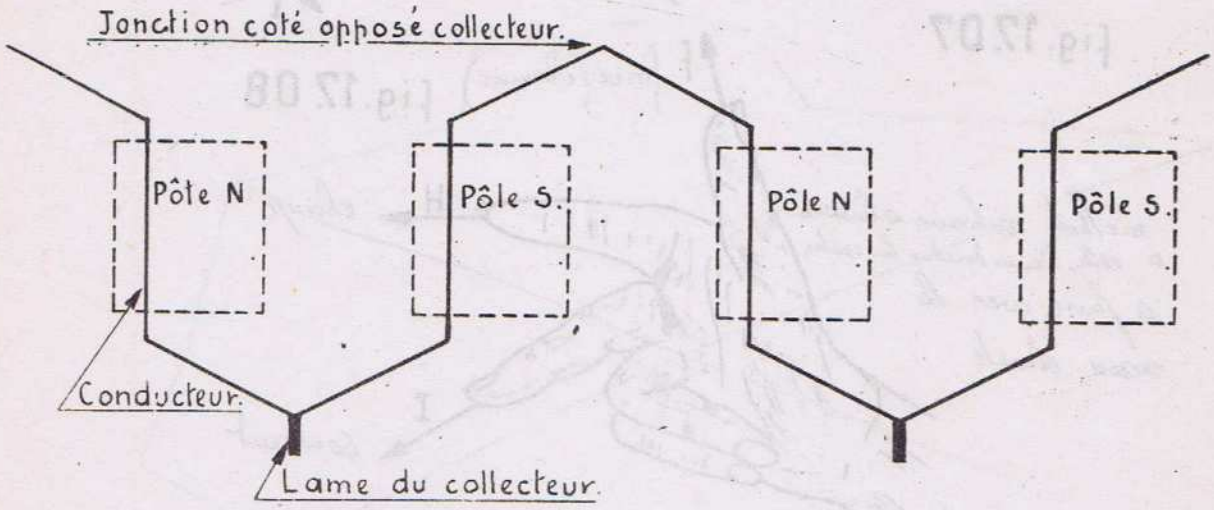


fig. 17.02

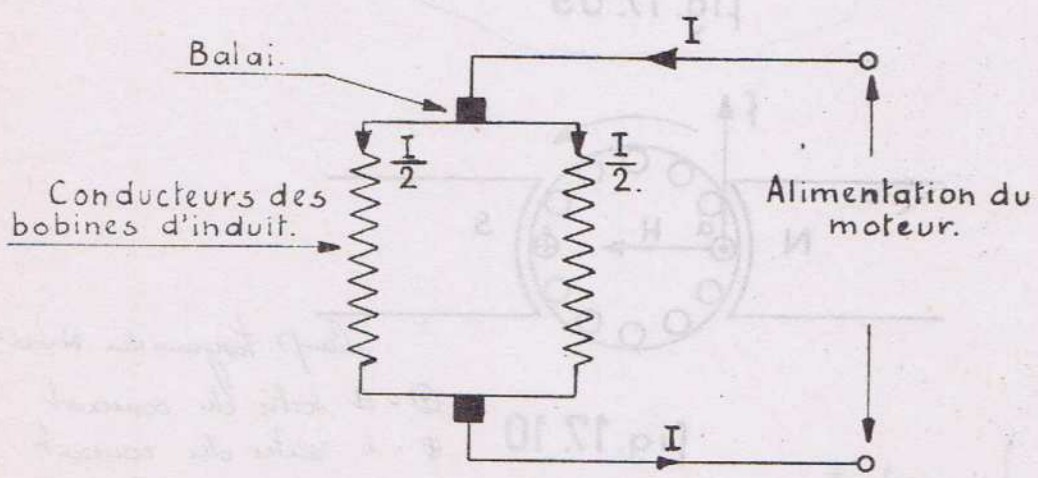


fig. 17.03

Excitation indépendante

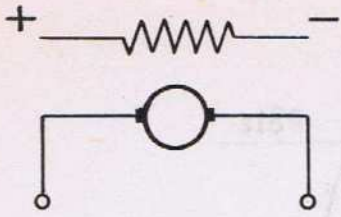


fig. 17.04

Excitation shunt

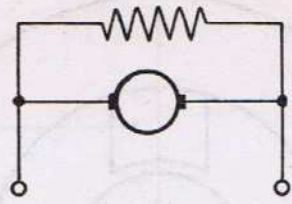


fig. 17.05

Excitation série

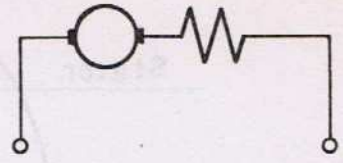


fig. 17.06

Excitation compound.

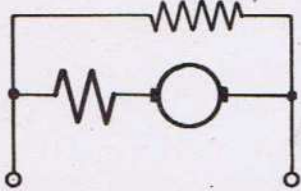


fig. 17.07

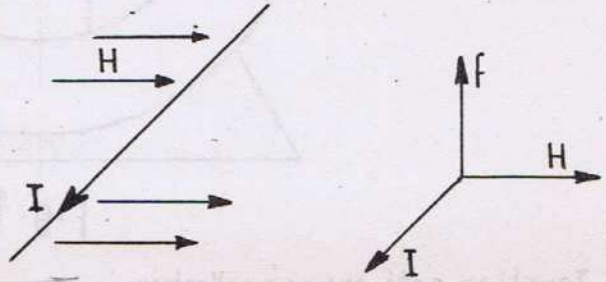


fig. 17.08

methode certaine a la suite
a celle dans toutes les autres
a faire avec la
main droite

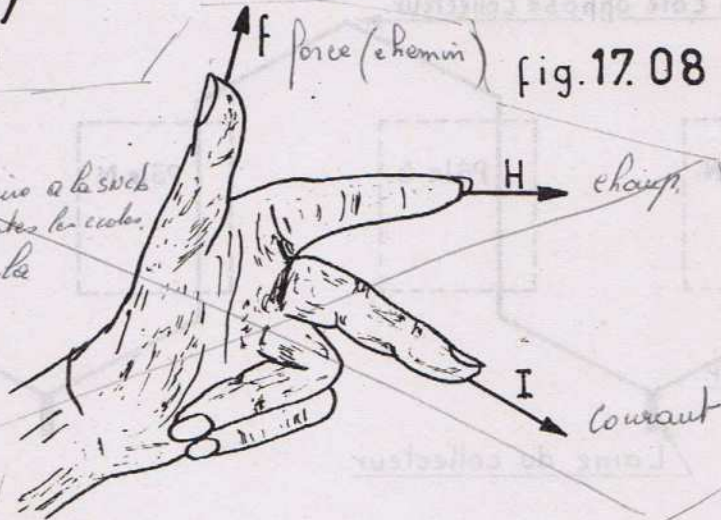


fig. 17.09

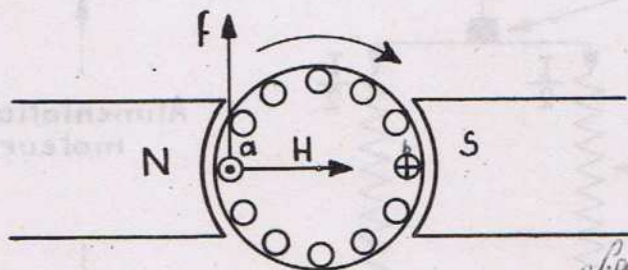


fig. 17.10

champ tangentiel du N vers S

⊙ = à sortie du courant
⊕ = à rentree du courant

H = champ - pouce
F = chemin - index
I = courant - médium

} main droite
gauche. moteur

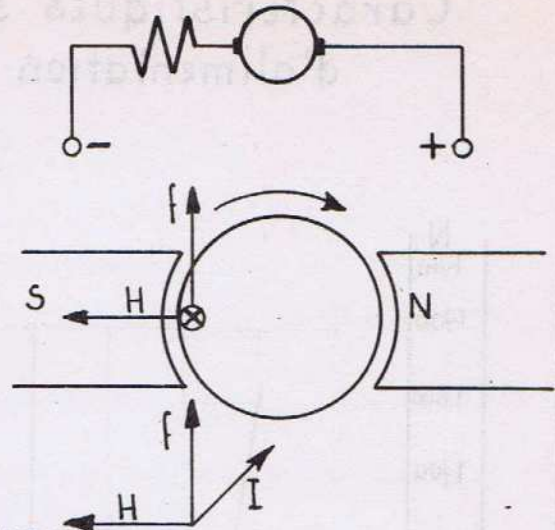
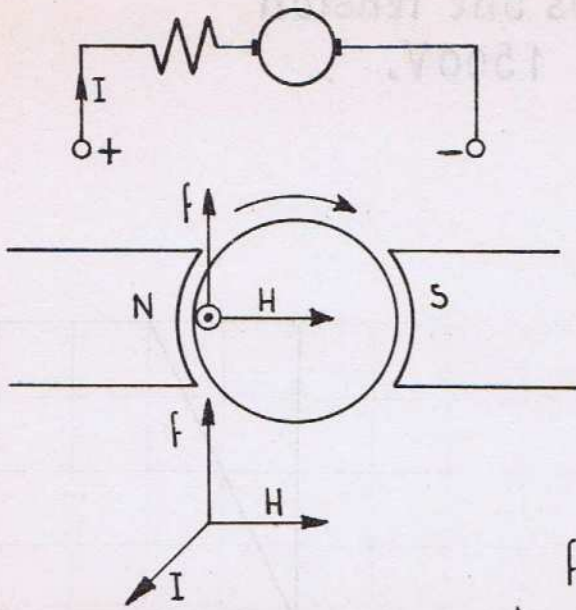


fig. 17.11

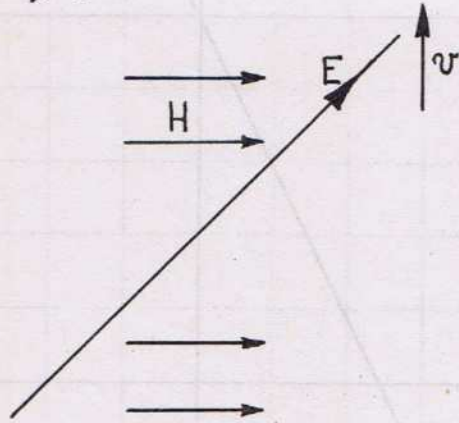


fig. 17.12

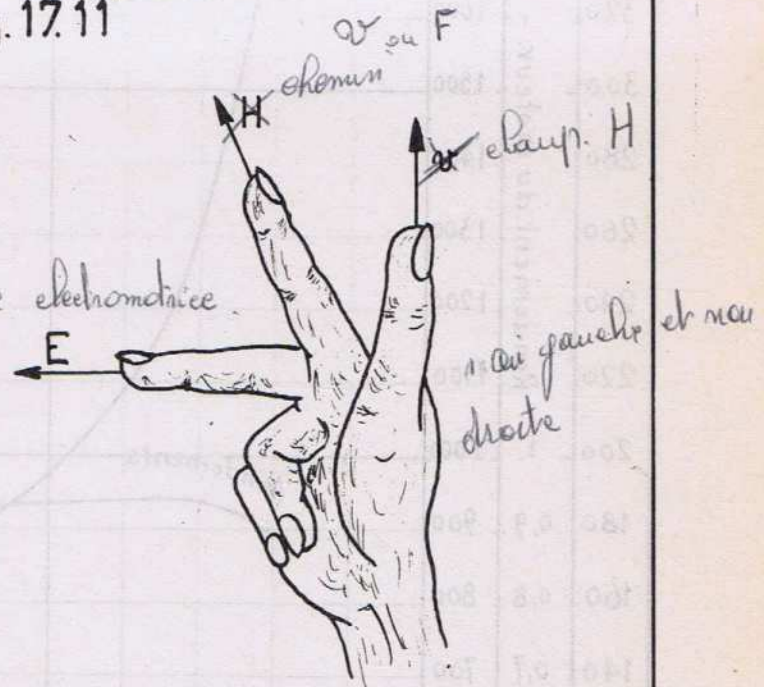


fig. 17.13

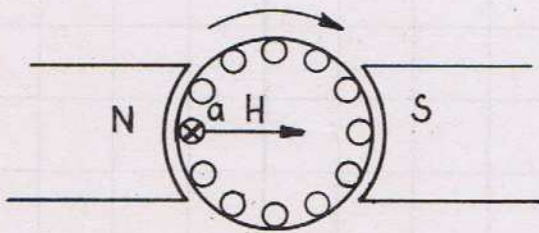


fig. 17.14

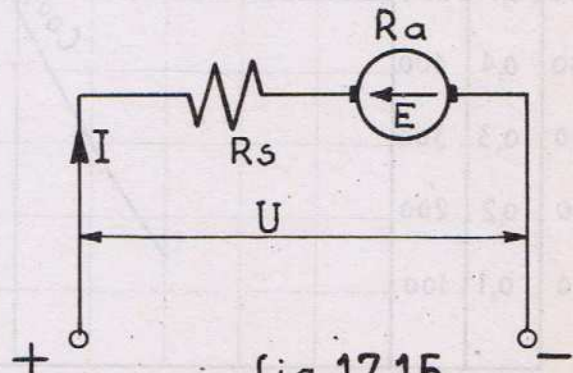


fig. 17.15

Caractéristiques sous une tension d'alimentation de 1.500V.

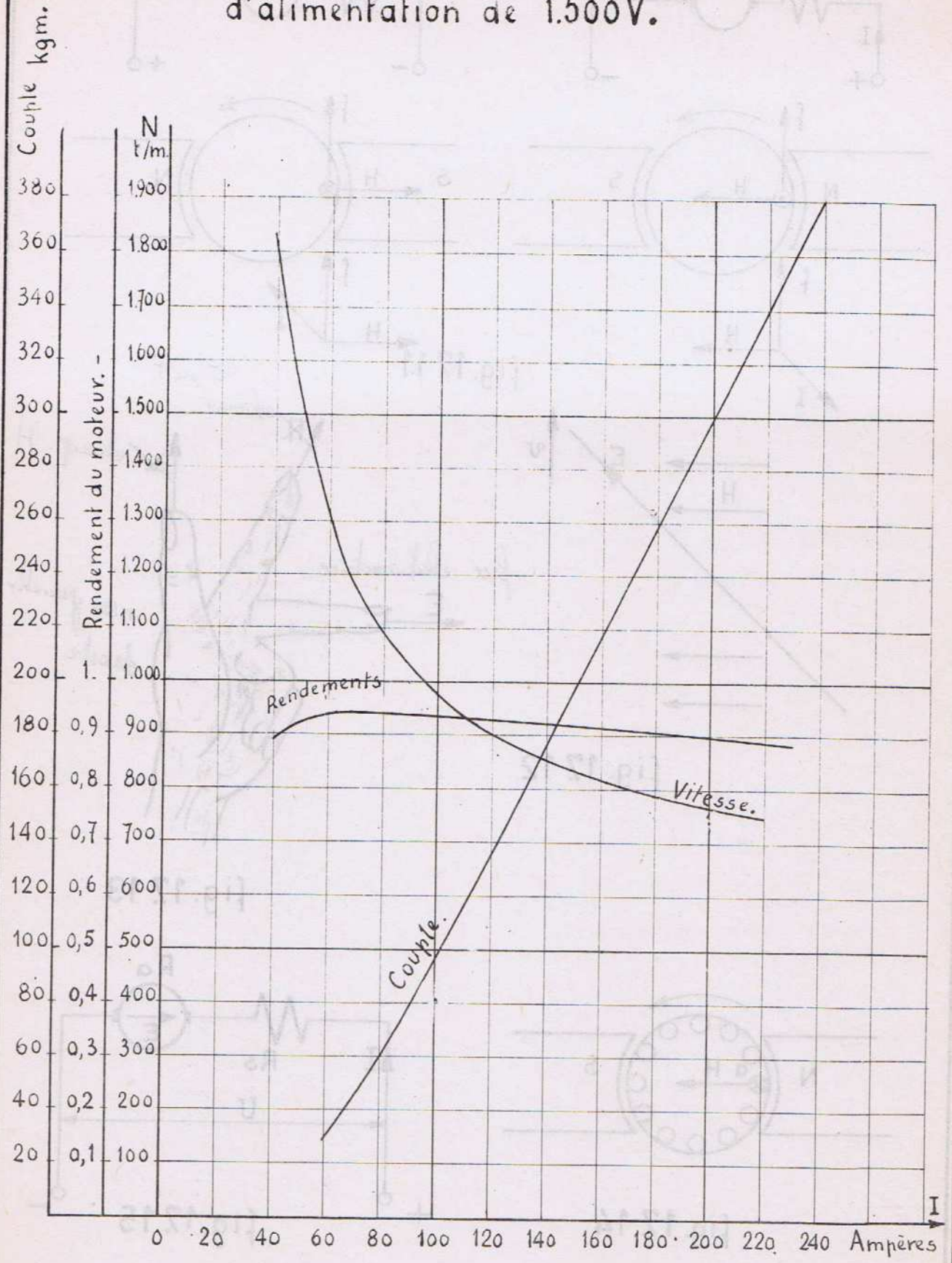


fig.17.16

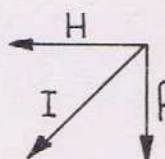
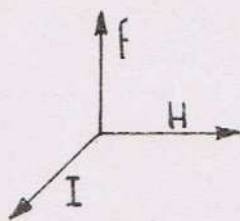
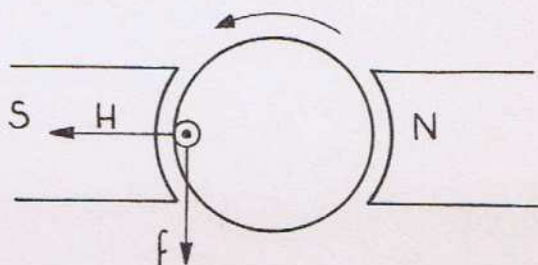
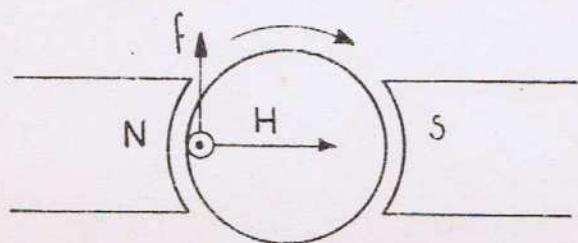
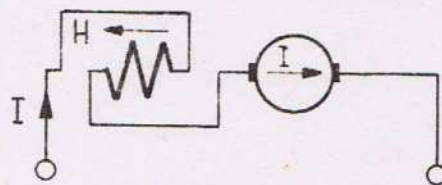
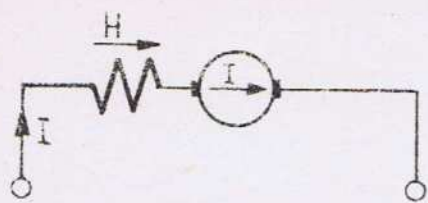


Fig. 17. 17.

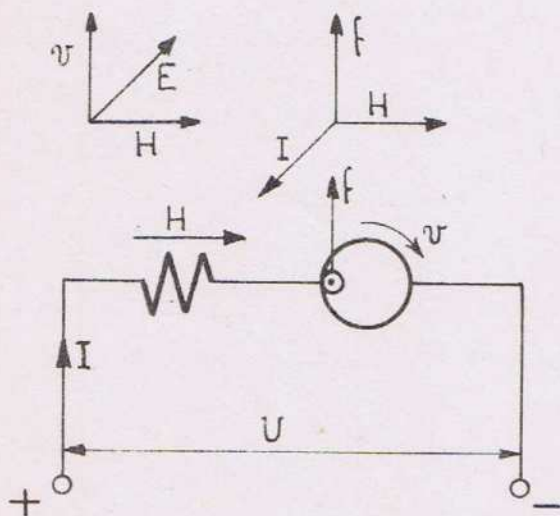


Fig. 17. 18

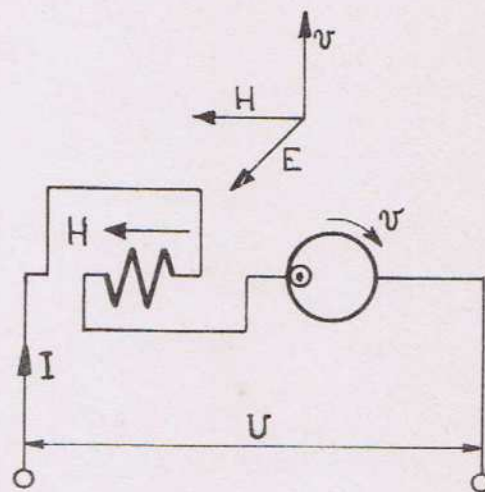


Fig. 17. 19

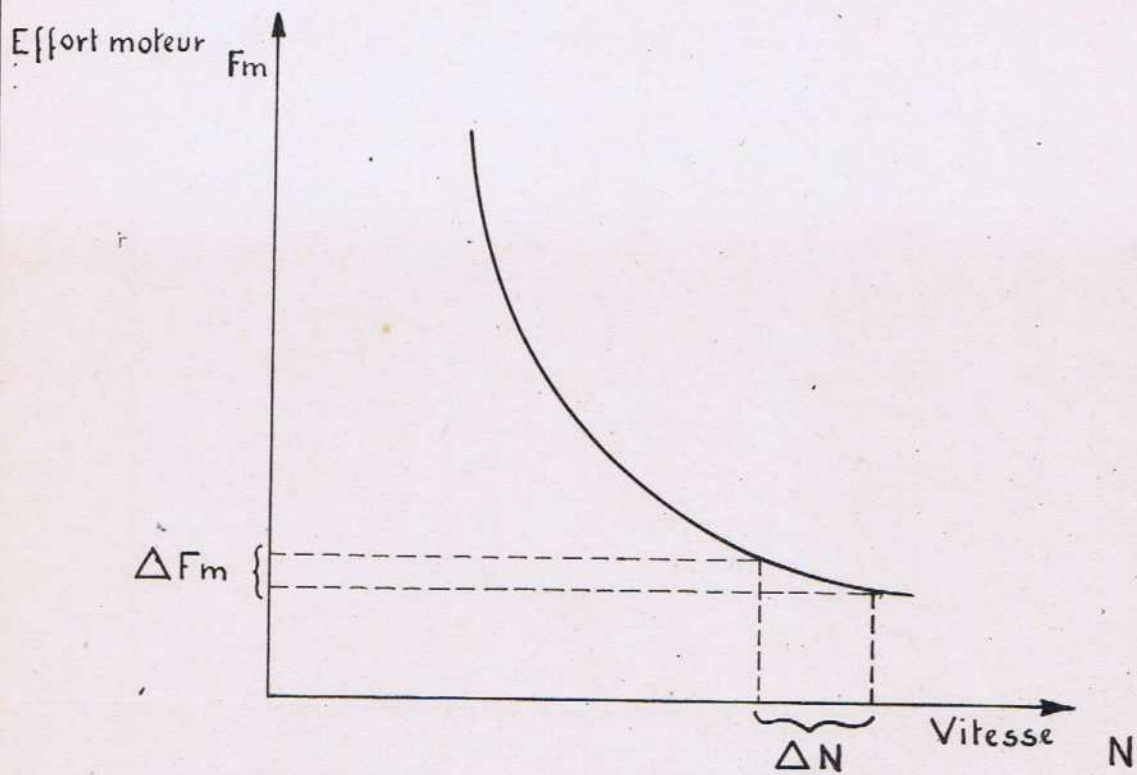


Fig. 18.01

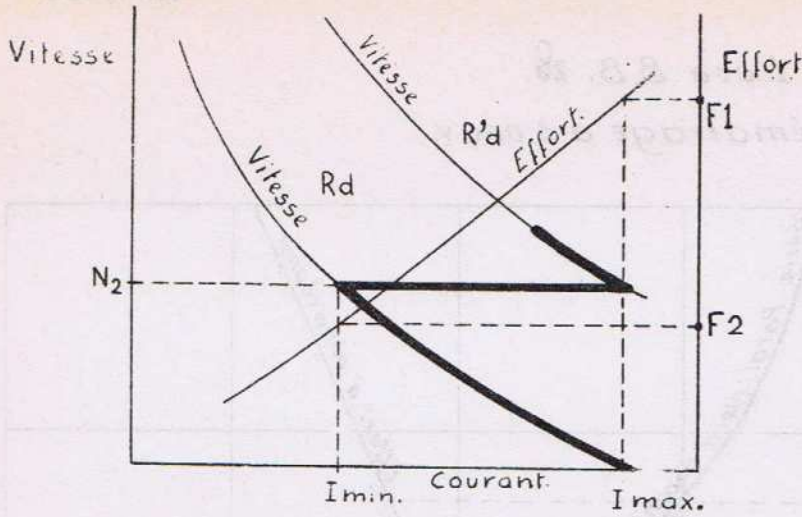


fig. 19.01

$$W_p = U \cdot I \cdot t = \omega \cdot I \cdot t$$

$$W_M = \frac{\omega T}{2\pi} \times I + \frac{\omega T}{2\pi} \times I = \omega I T$$

$$W_R = \frac{U^2}{R} \cdot I \cdot t = U I T$$

$$\eta = \frac{W_M}{W_p} = \frac{\omega I T}{\omega I T} = 1/2 = 0,5 \Rightarrow 50\%$$

Démarrage de 2 moteurs en parallèle.

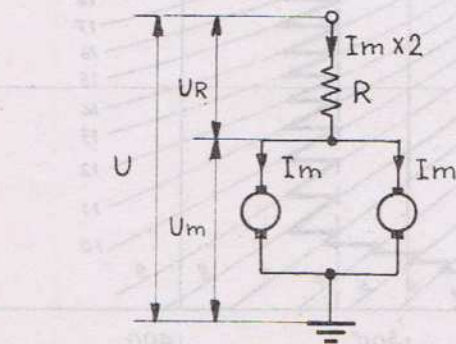
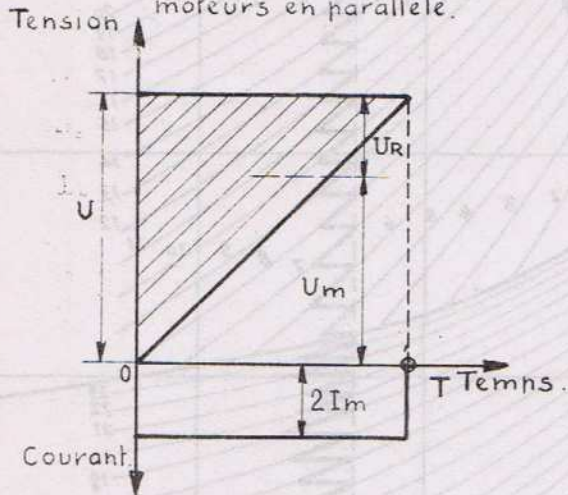


fig. 19.04

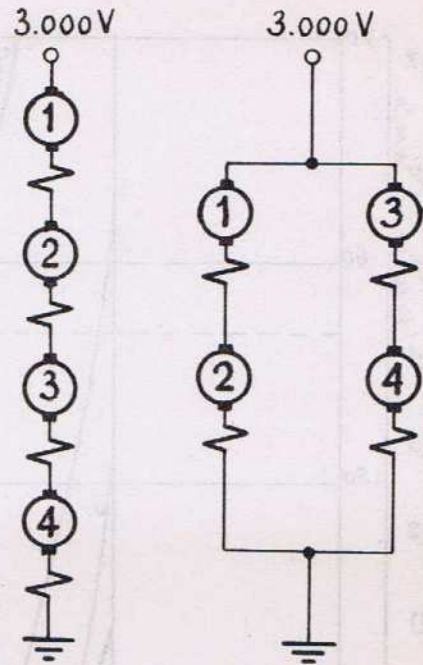


fig. 19.03

Démarrage de 2 moteurs en série-parallèle.

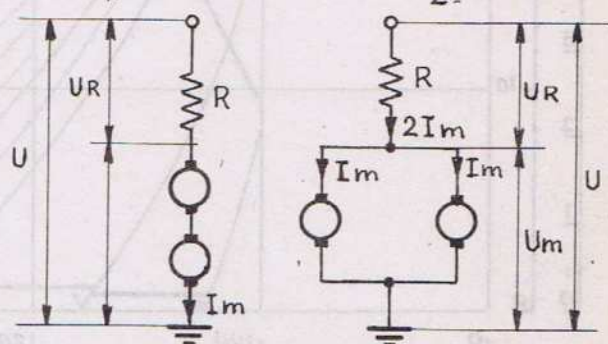
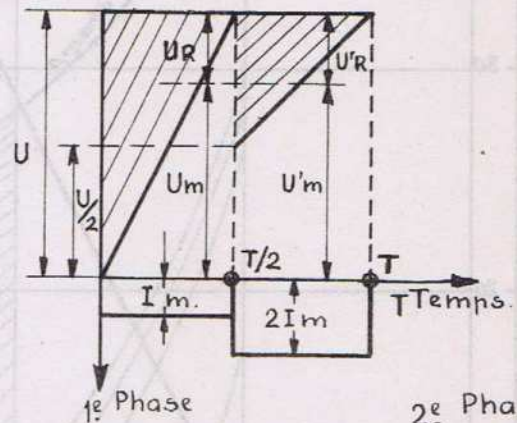


fig. 19.05

Loco B.B. 28.
 Courbes de démarrage à 3.000 v.

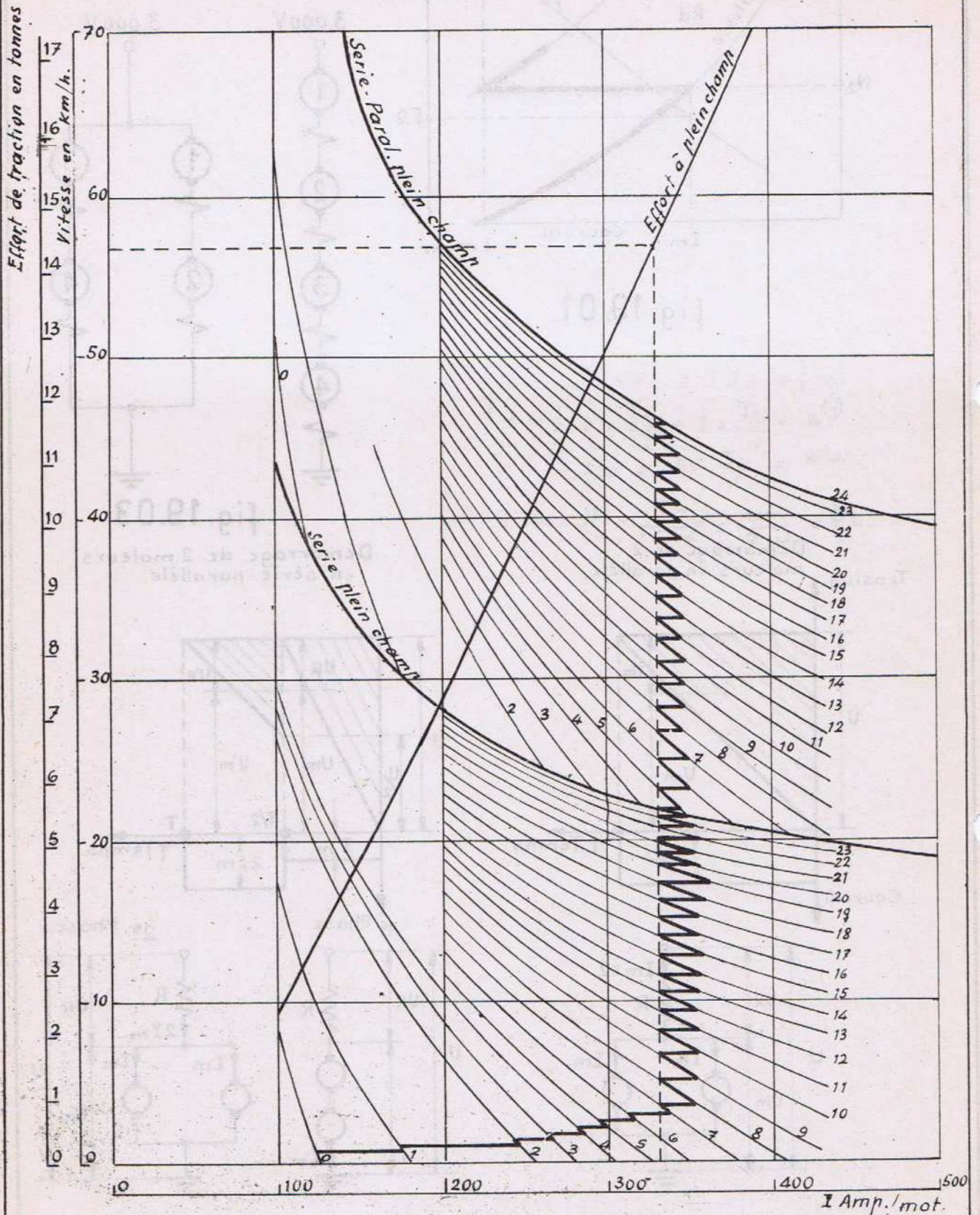


fig. 19.02

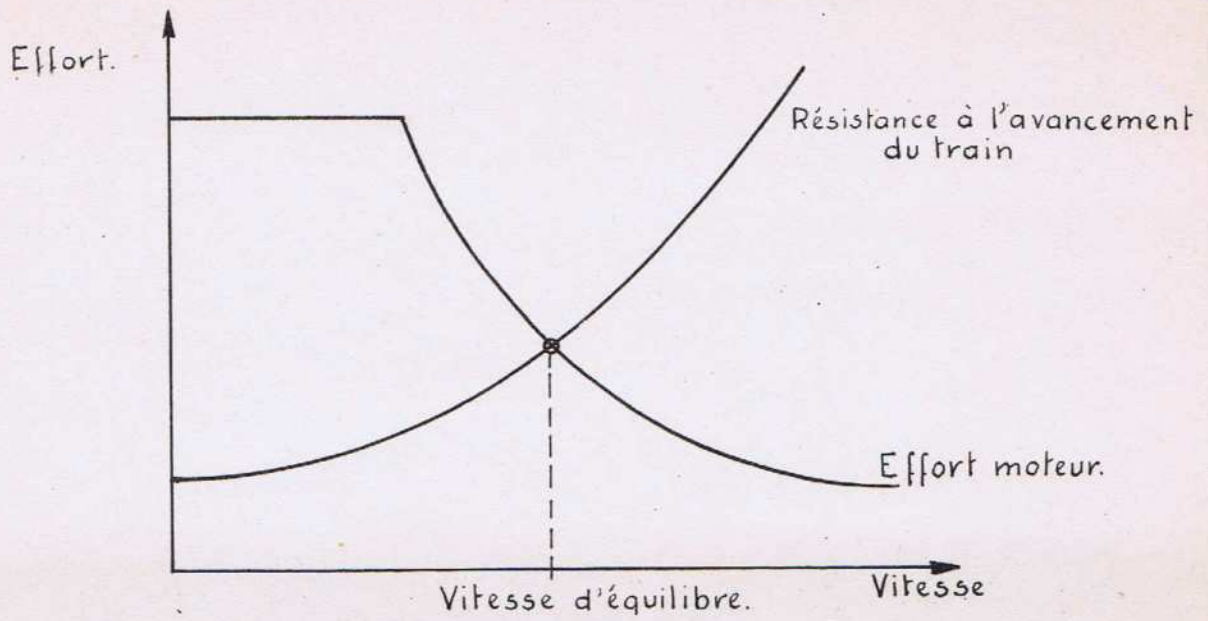


fig. 19.06

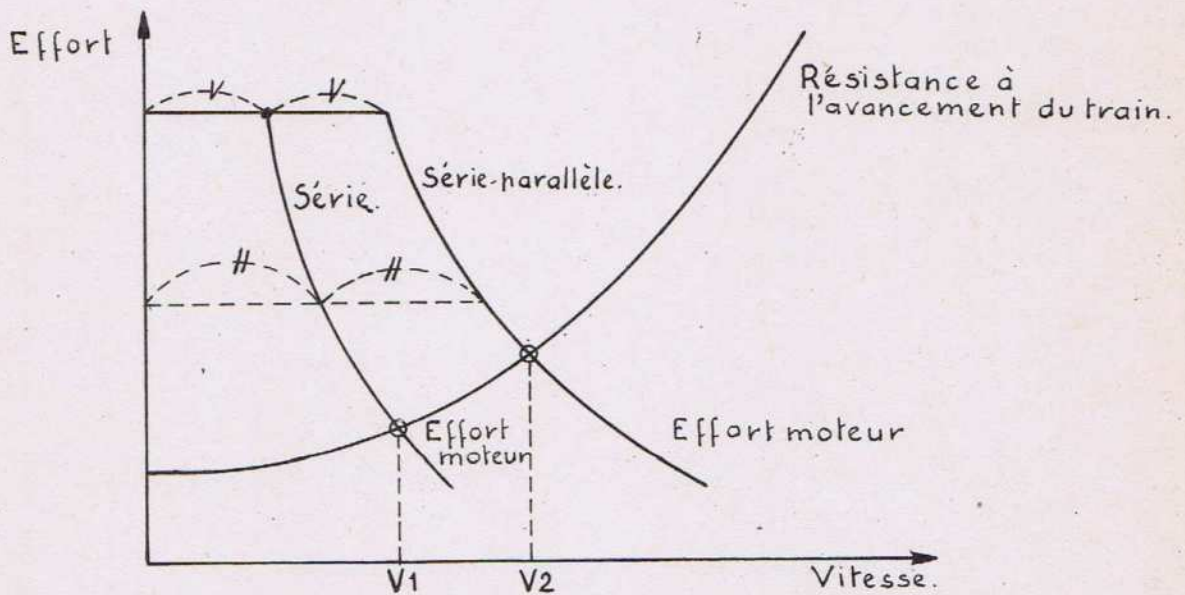


fig. 19.07

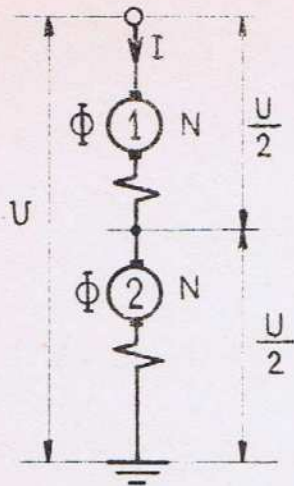


fig. 21.01

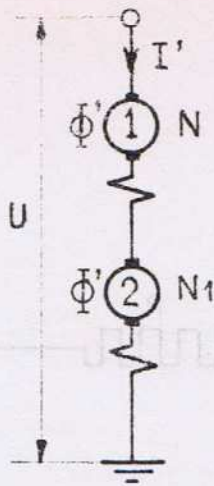


fig. 21.02

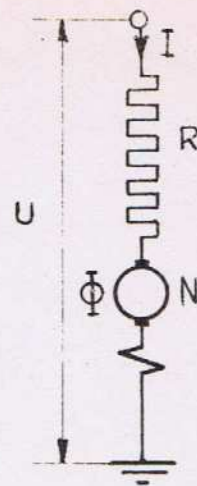


fig. 21.03

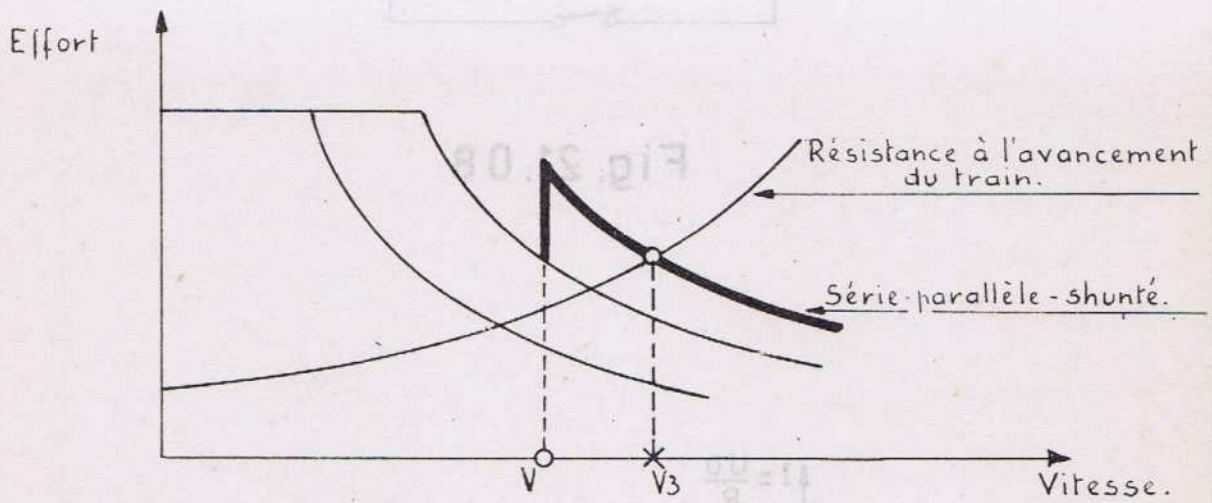


fig. 21.04

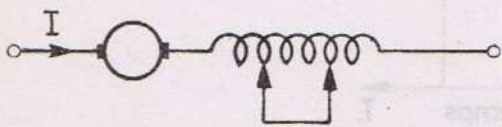


fig. 21.05

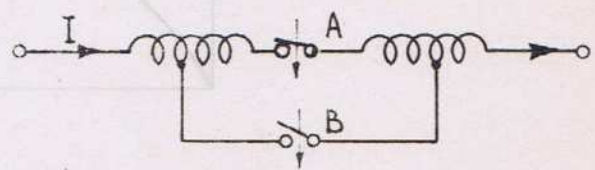


fig. 21.06

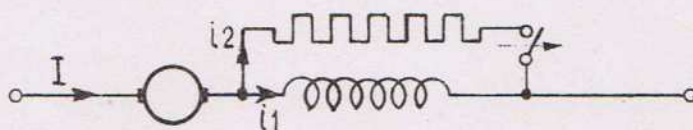


fig. 21.07

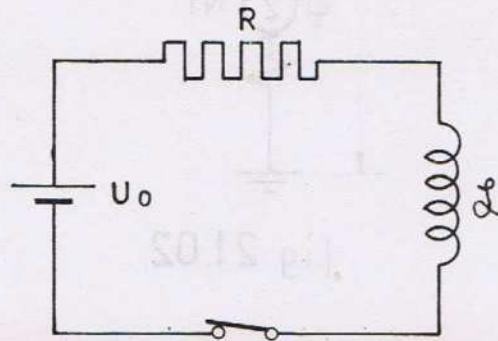


Fig. 21.08

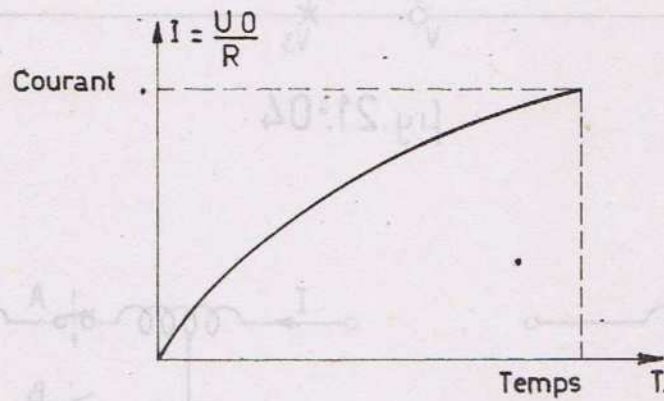


Fig. 21.09

Fonctionnement des contacteurs.

Crans	Contacteurs-												
	Sh	I'	K1	K3	K5	K7	G	K2	K4	K6	K8	P	S0
1													
2													
3													
4													
5													
6													
7													
8													
9													
T1													
T2													
10													
11													
12													
13													
14													
15													
16													
17													
18													
19													
20													
21													

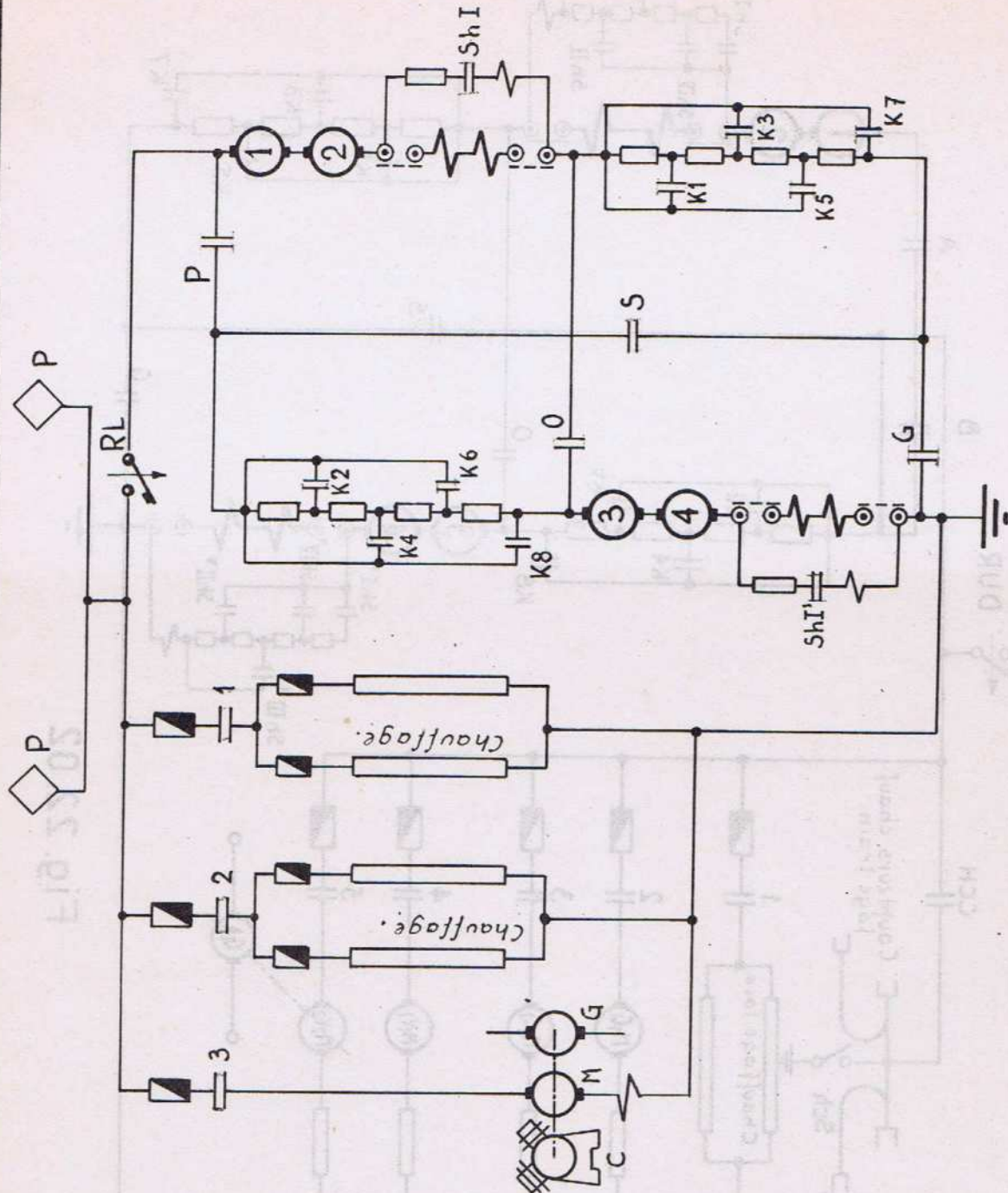


Fig. 22.01.

Crans de shuntage des contact.

Crans	Contacteurs									
	Sh I	Sh II	Sh III	Sh IV	Sh I'	Sh II'	Sh III'	Sh IV'	Sh I''	Sh II''
1	•									
2	•	•								
3	•	•	•							
4	•	•	•	•						
5	•	•	•	•	•					
6	•	•	•	•	•	•				
7	•	•	•	•	•	•	•			
8	•	•	•	•	•	•	•	•		
9	•	•	•	•	•	•	•	•	•	
10	•	•	•	•	•	•	•	•	•	•

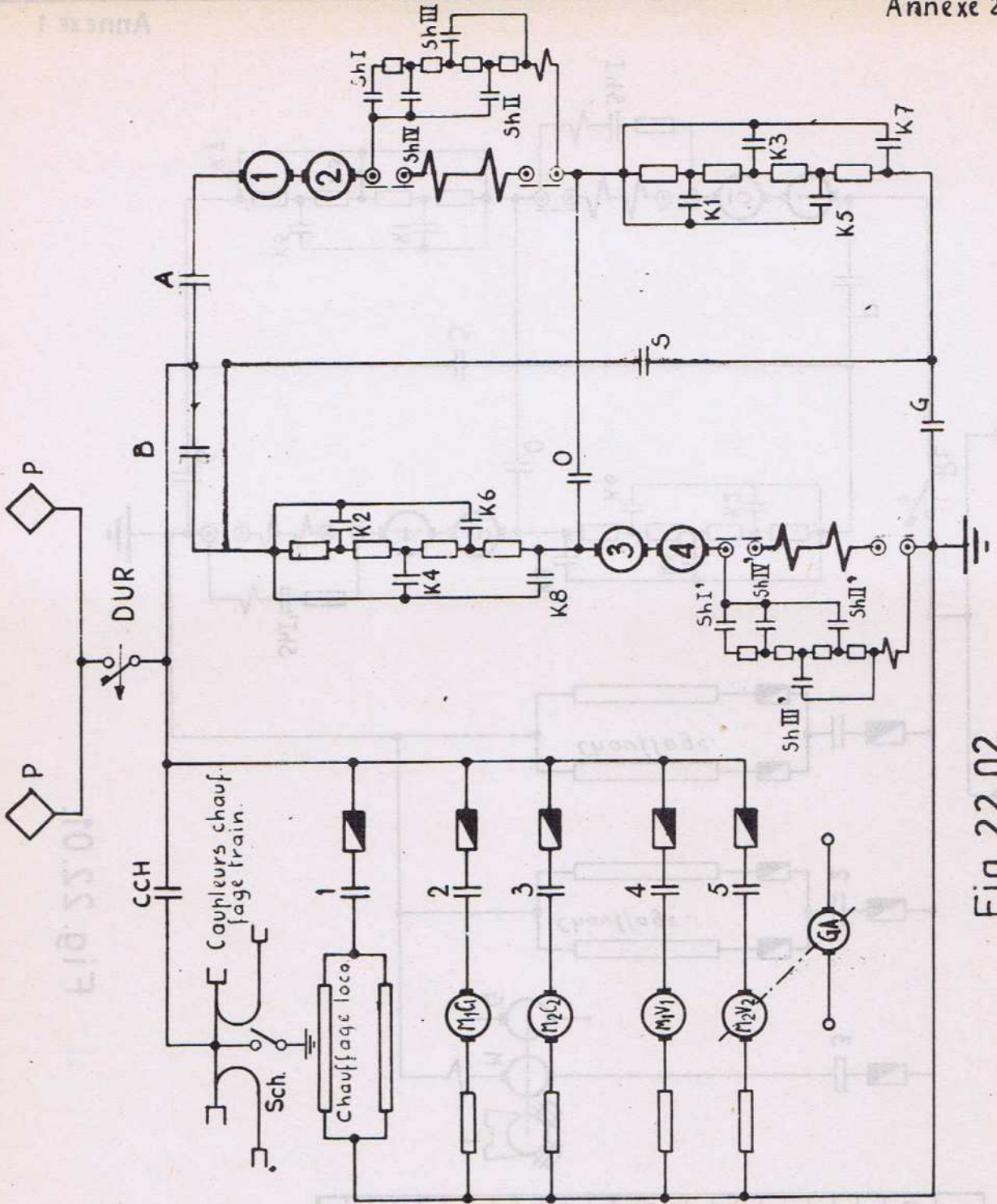


Fig. 22.02

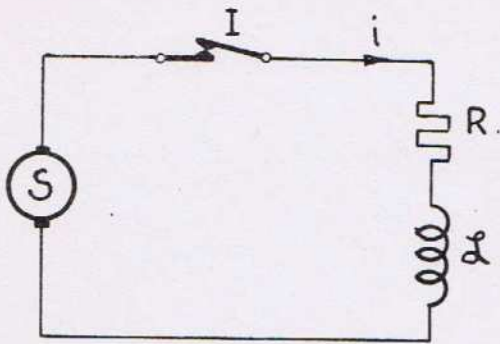


fig. 23.01

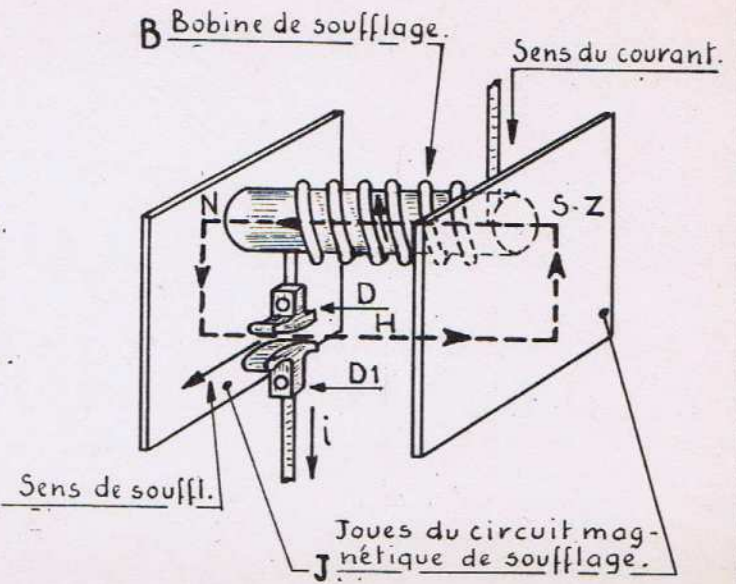


fig. 23.02

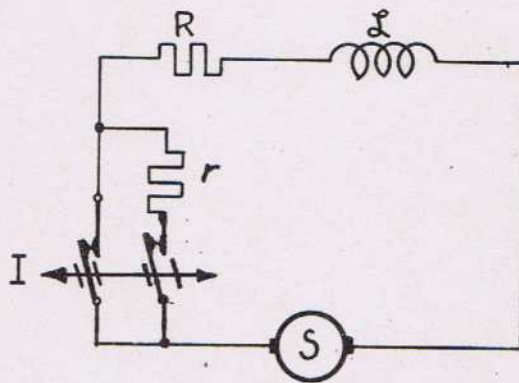


fig. 23.03.

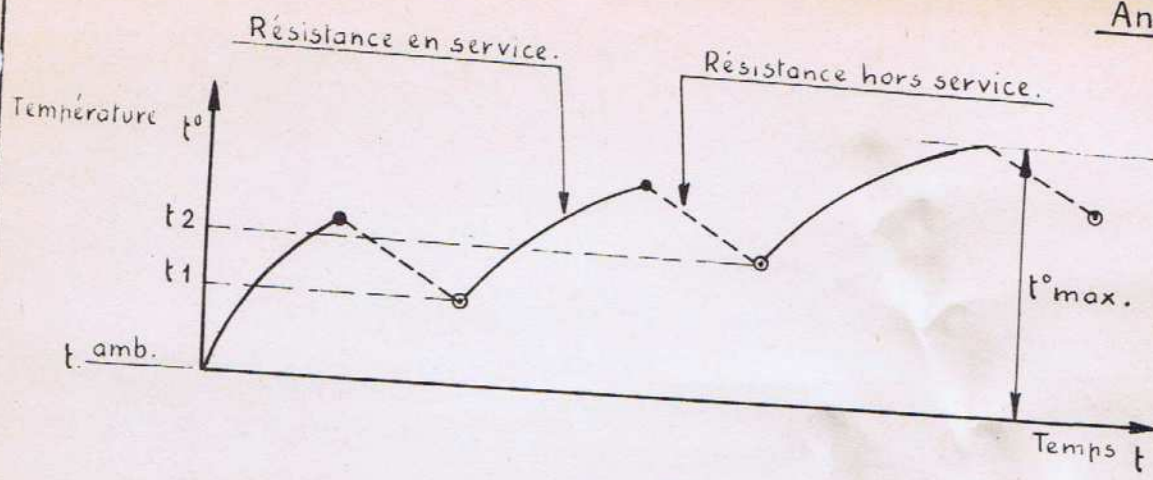


fig. 25.01

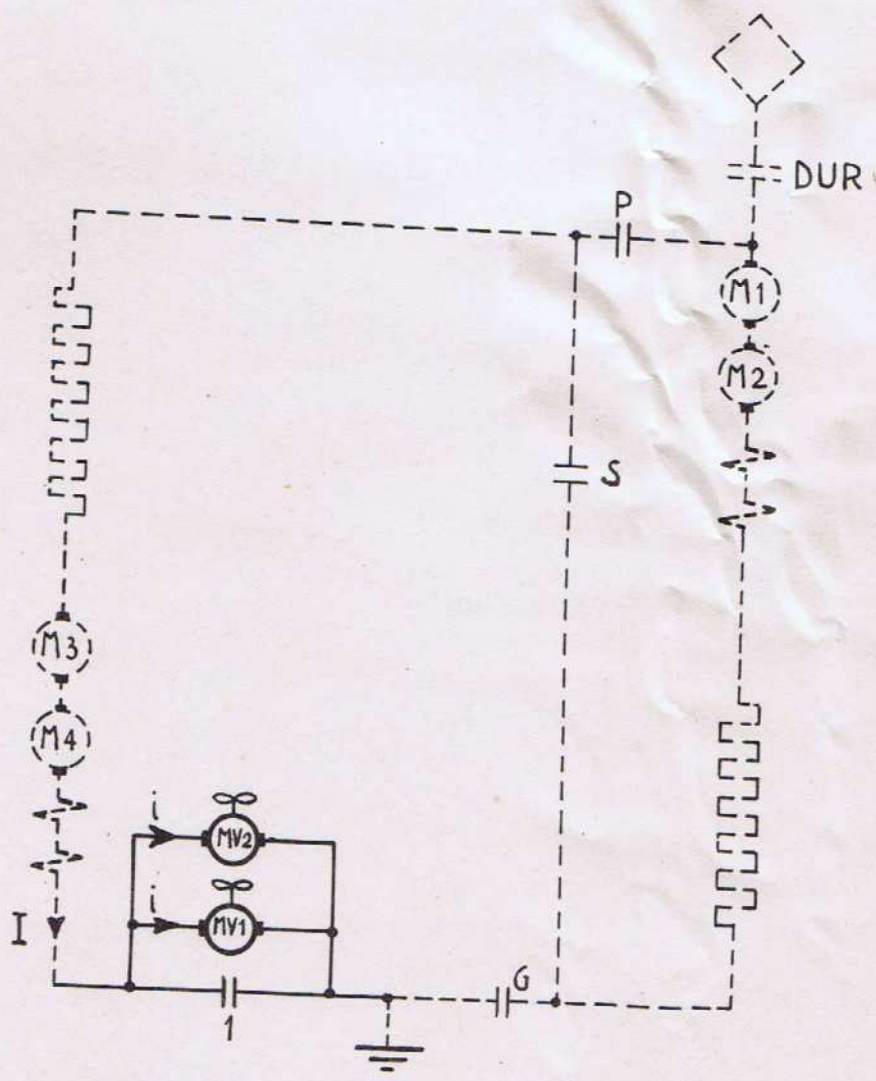


fig. 25.02

methode par ecoulement

methode du Pouch

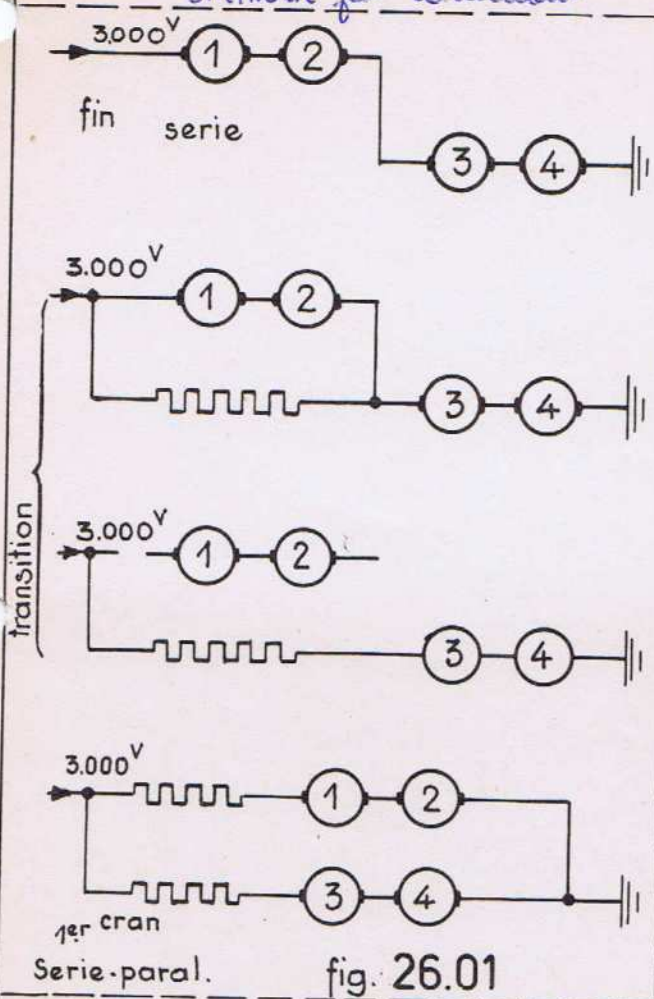


fig. 26.01

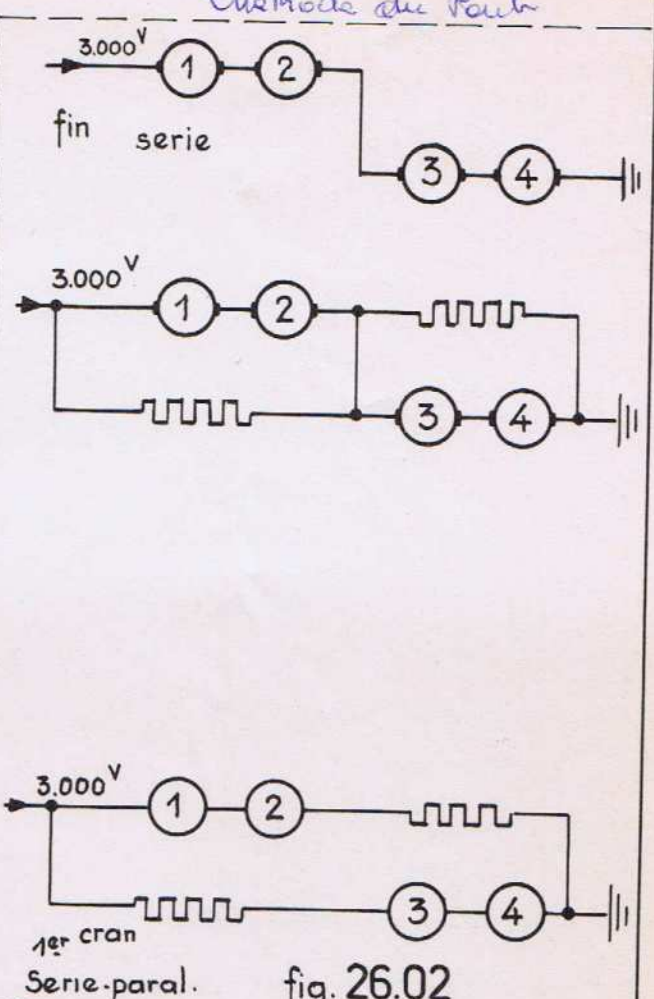


fig. 26.02

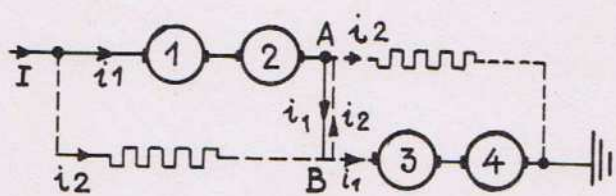


fig. 26.03

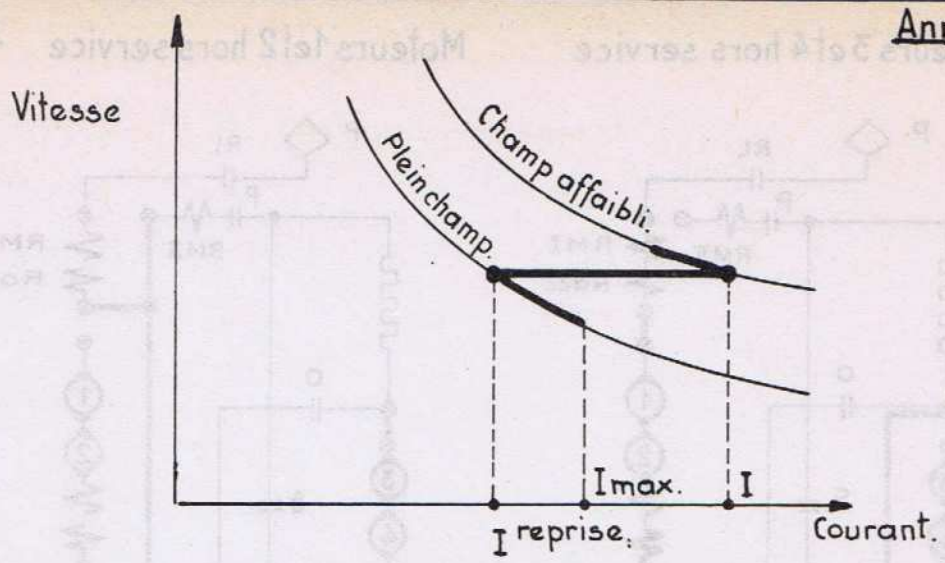


fig. 27.01

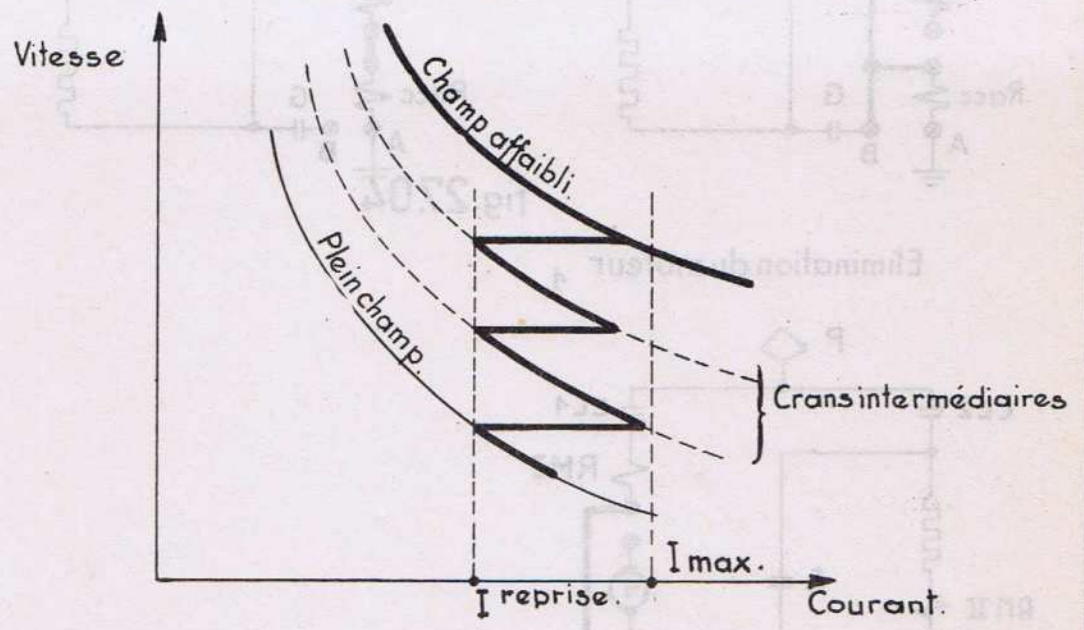


fig. 27.02

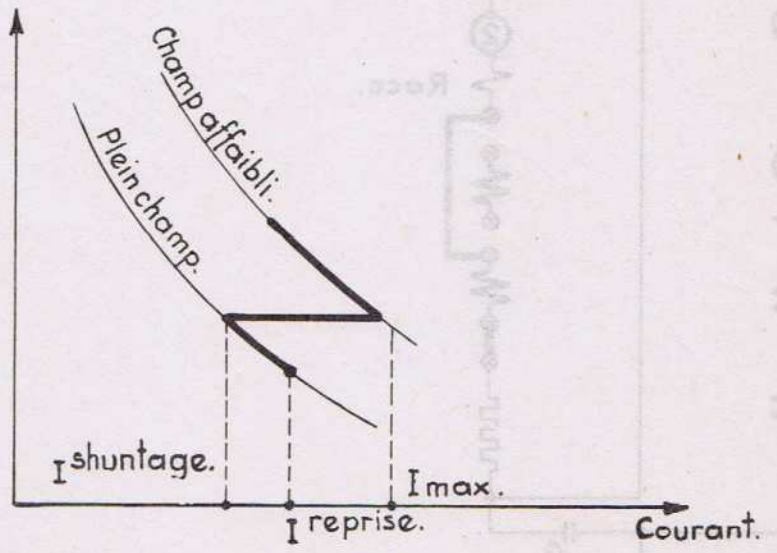


fig. 27.03

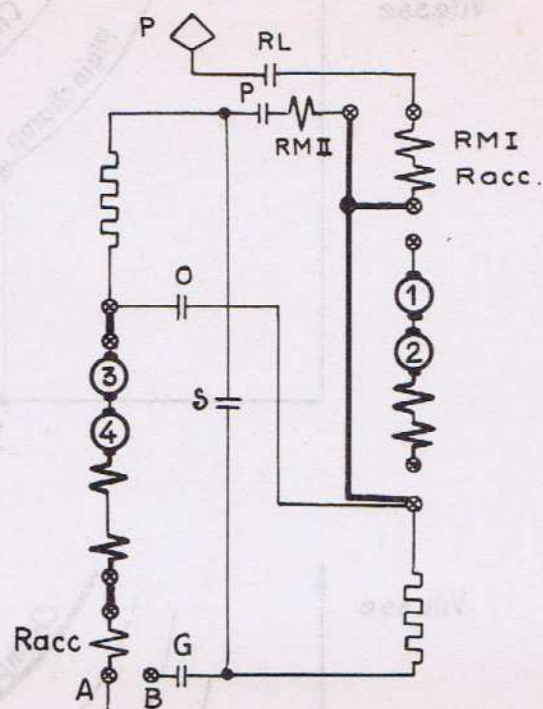
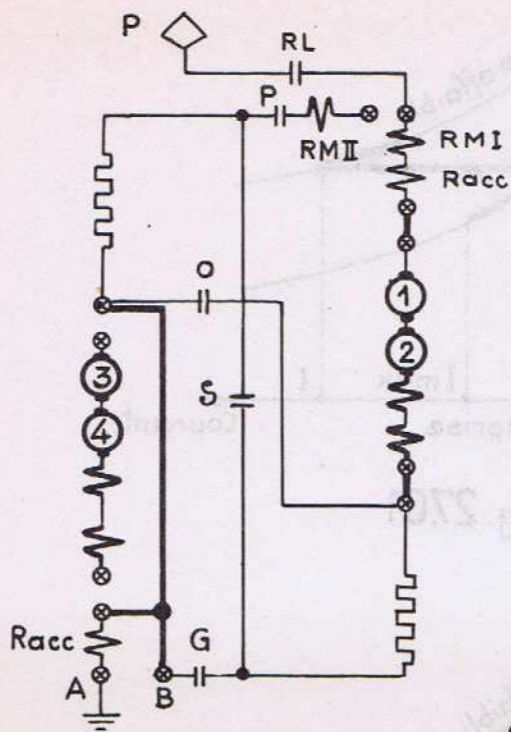


fig. 27.04

Elimination du moteur 1

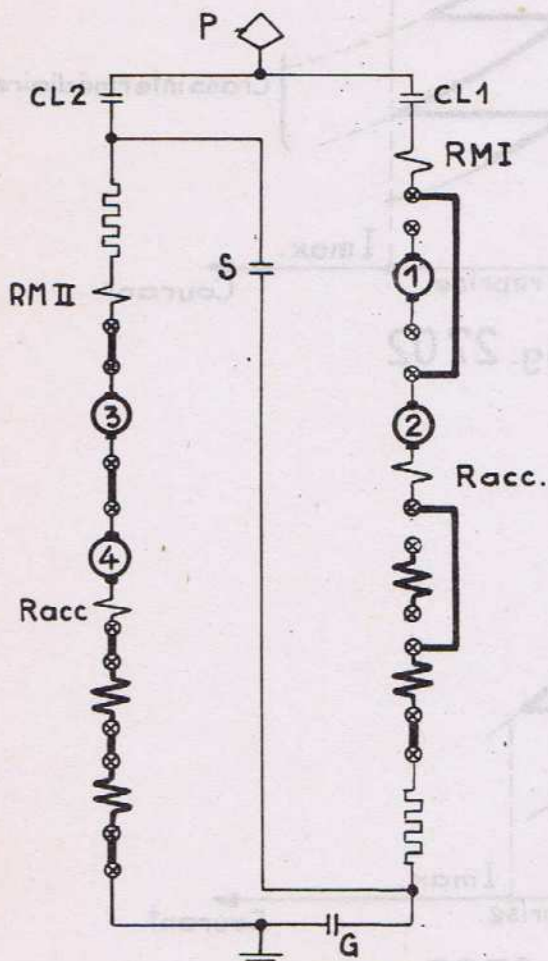


fig. 27.05

⊗ Bornes des sectionneurs d'élimination.

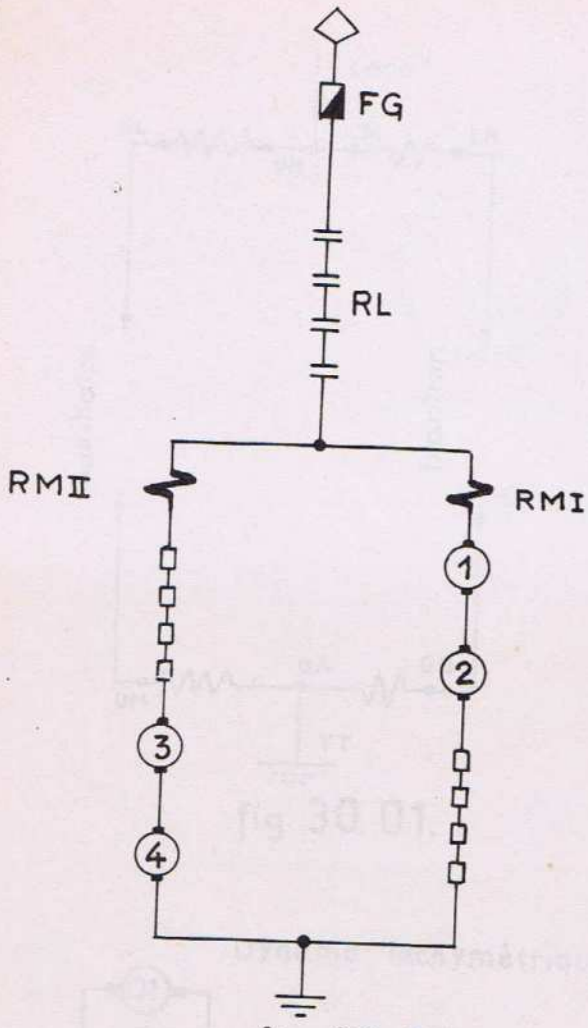


fig. 29.01

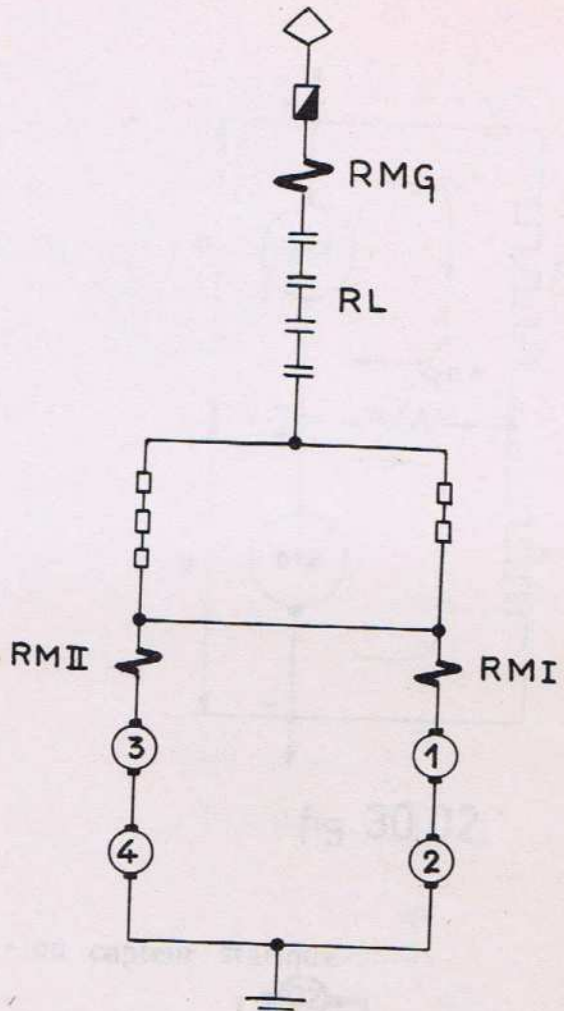


fig. 29.02

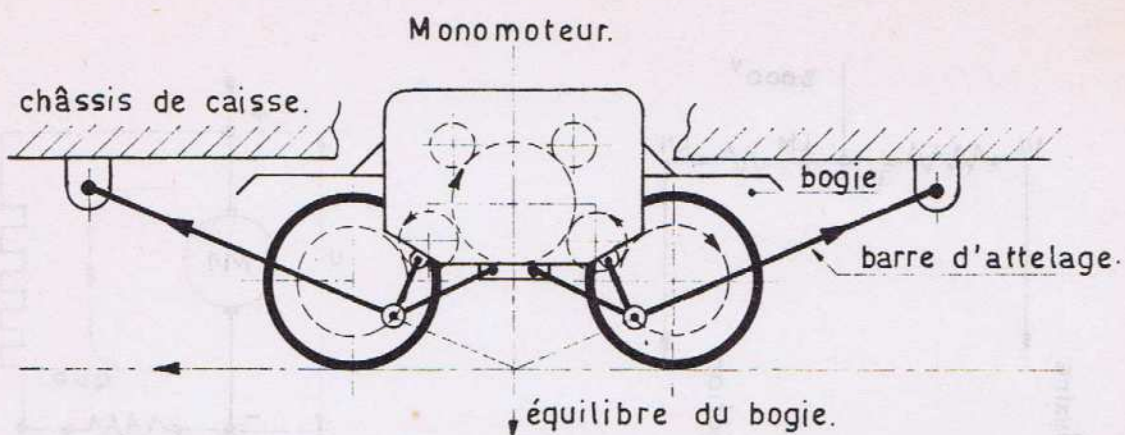


fig. 30.04

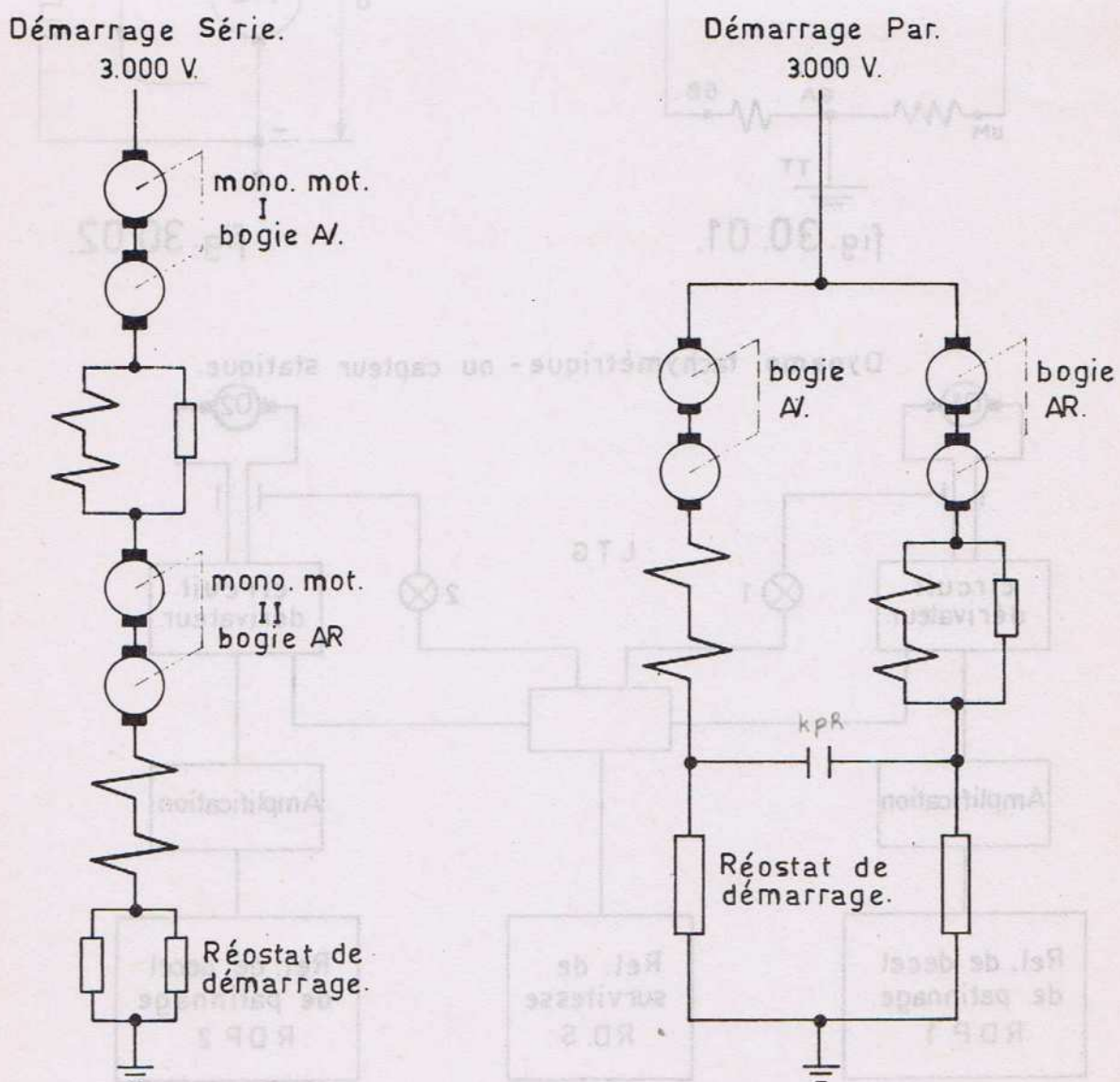


fig. 30.05.

Basse Tension

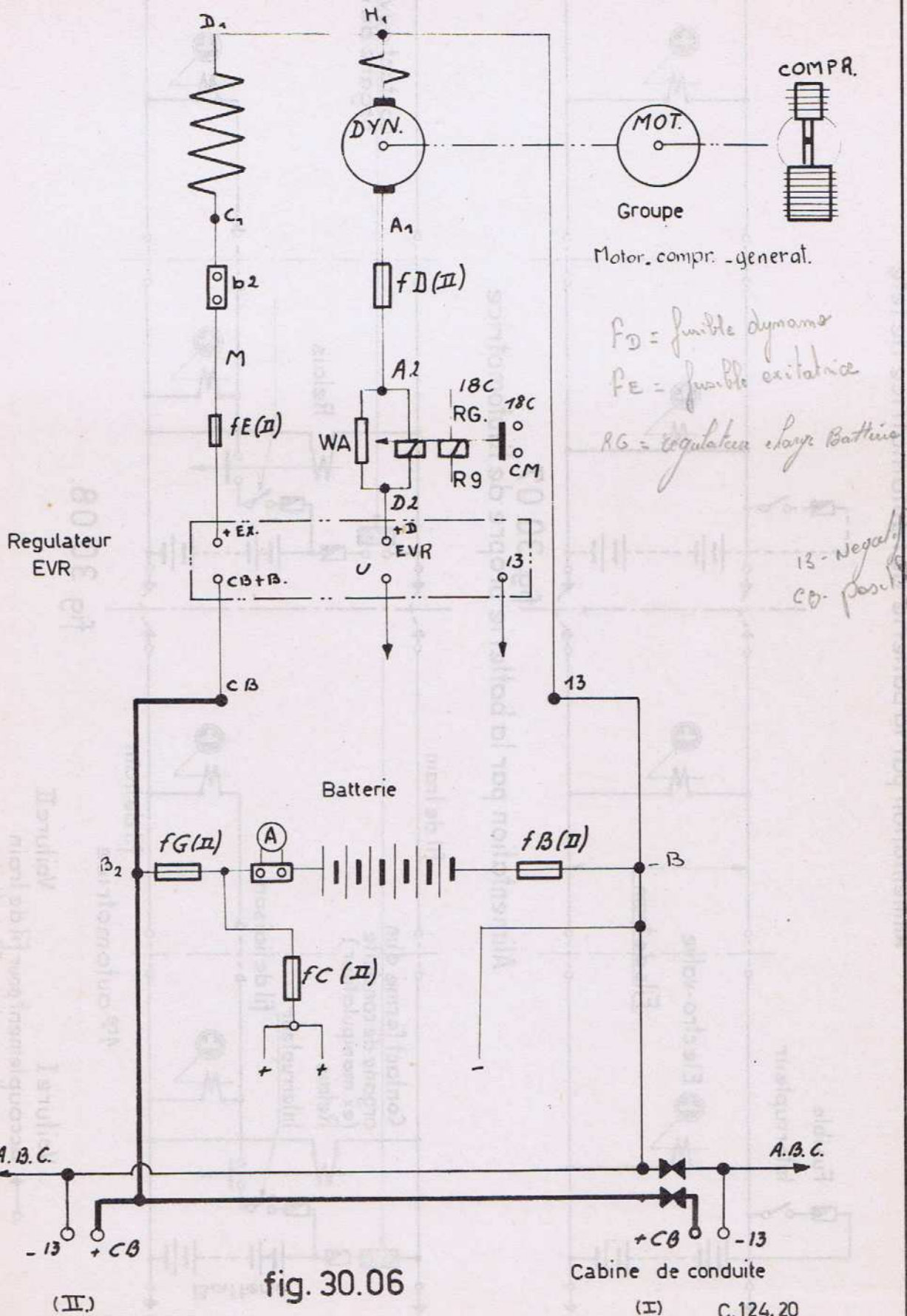


fig. 30.06

Cabine de conduite

(II)

(I)

C.124.20

Leçon 30

Electrovalve type admission

Bobine désexcitée.

Bobine excitée.

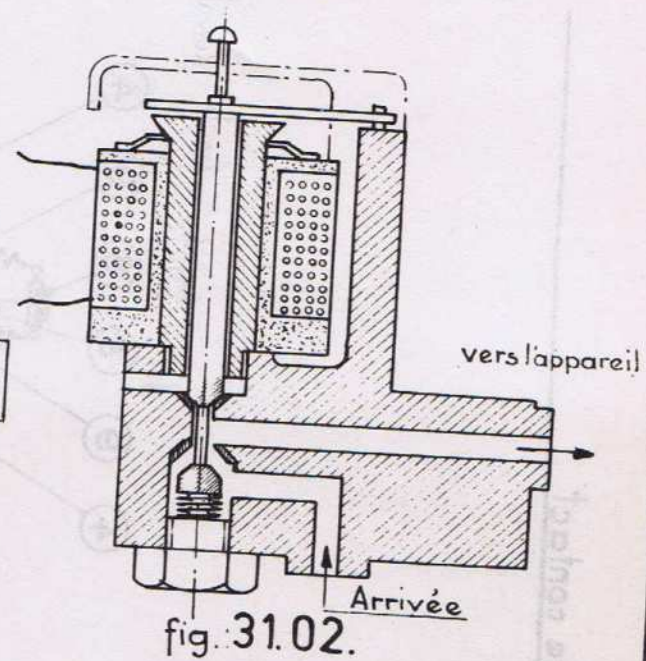
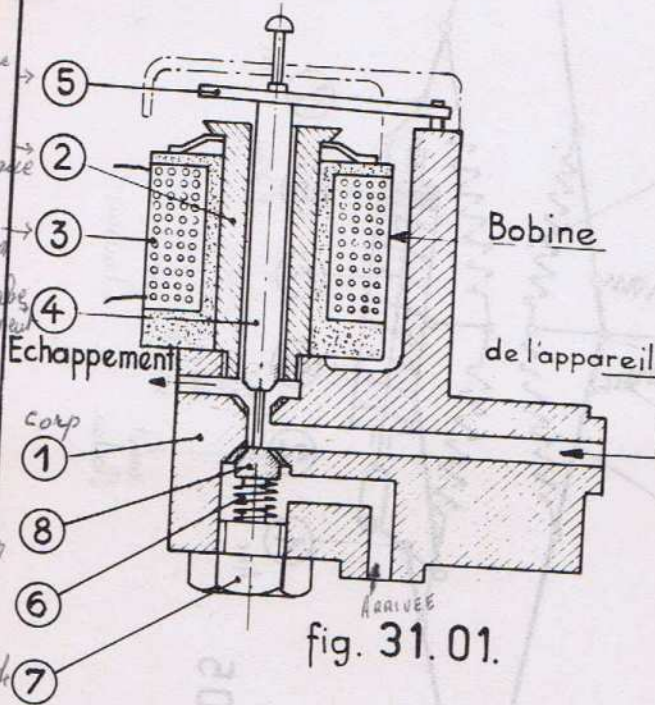


fig. 31.01.

fig. 31.02.

Electrovalve type échappement

Bobine excitée

Bobine désexcitée

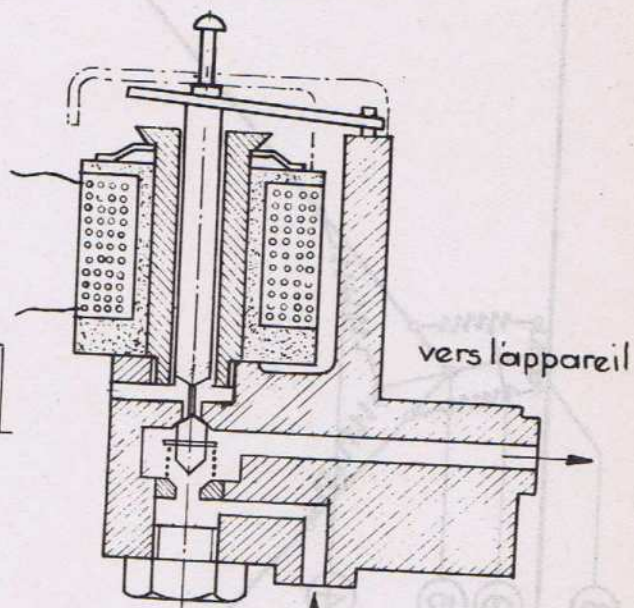
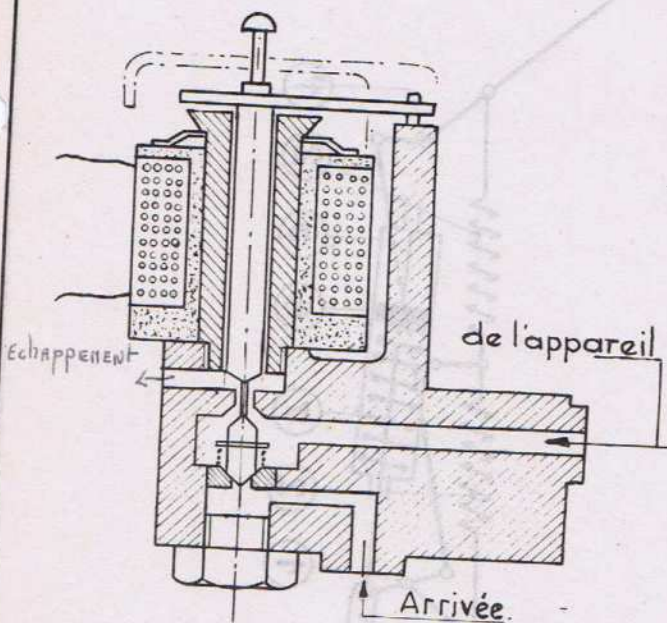


fig. 31.03

fig. 31.04

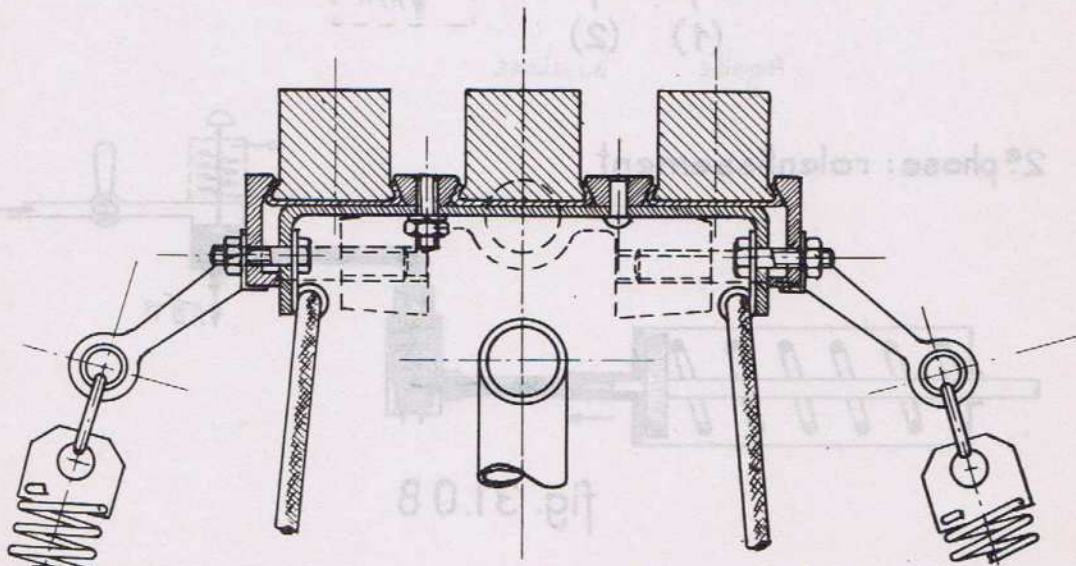
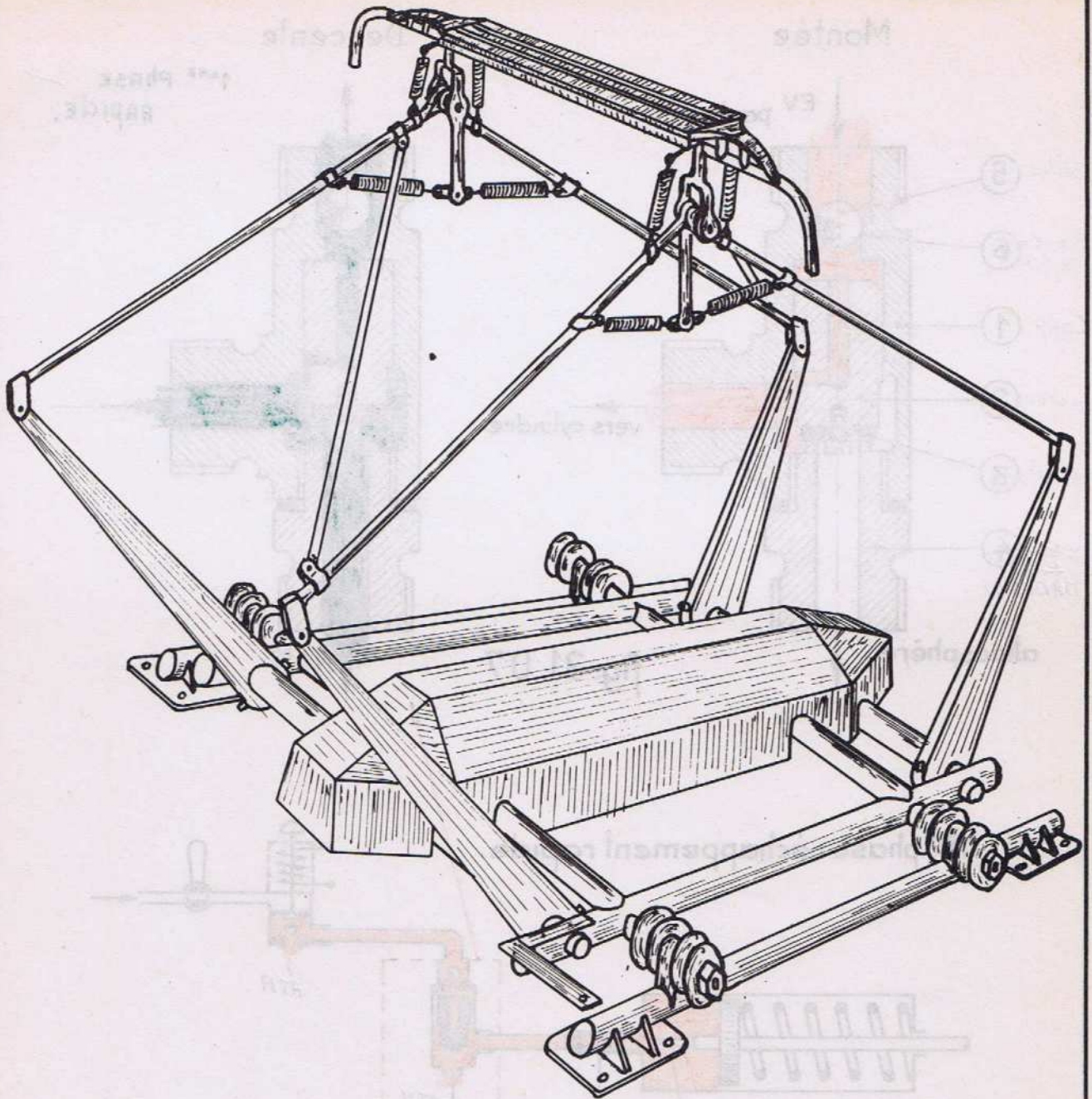


fig 31.06.

C.124.20
Leçon 31.

Alimentation par la batterie de l'automotrice de tête.

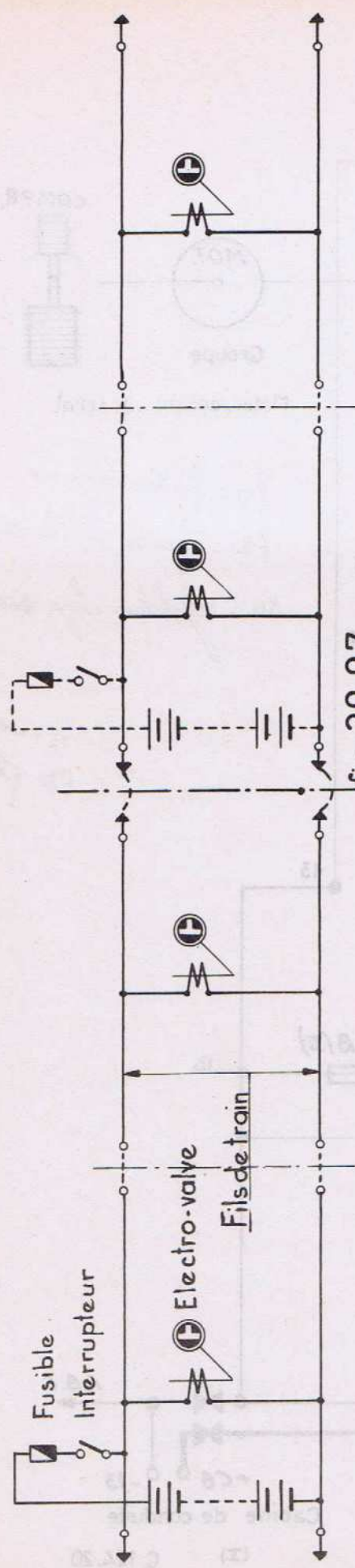


fig. 30.07. Alimentation par la batterie propre de l'automotrice

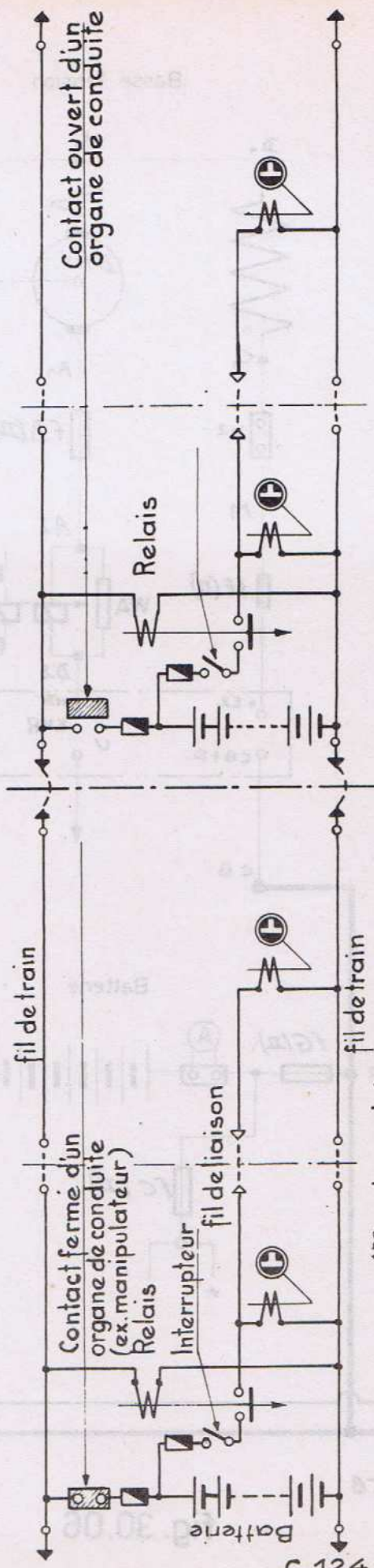
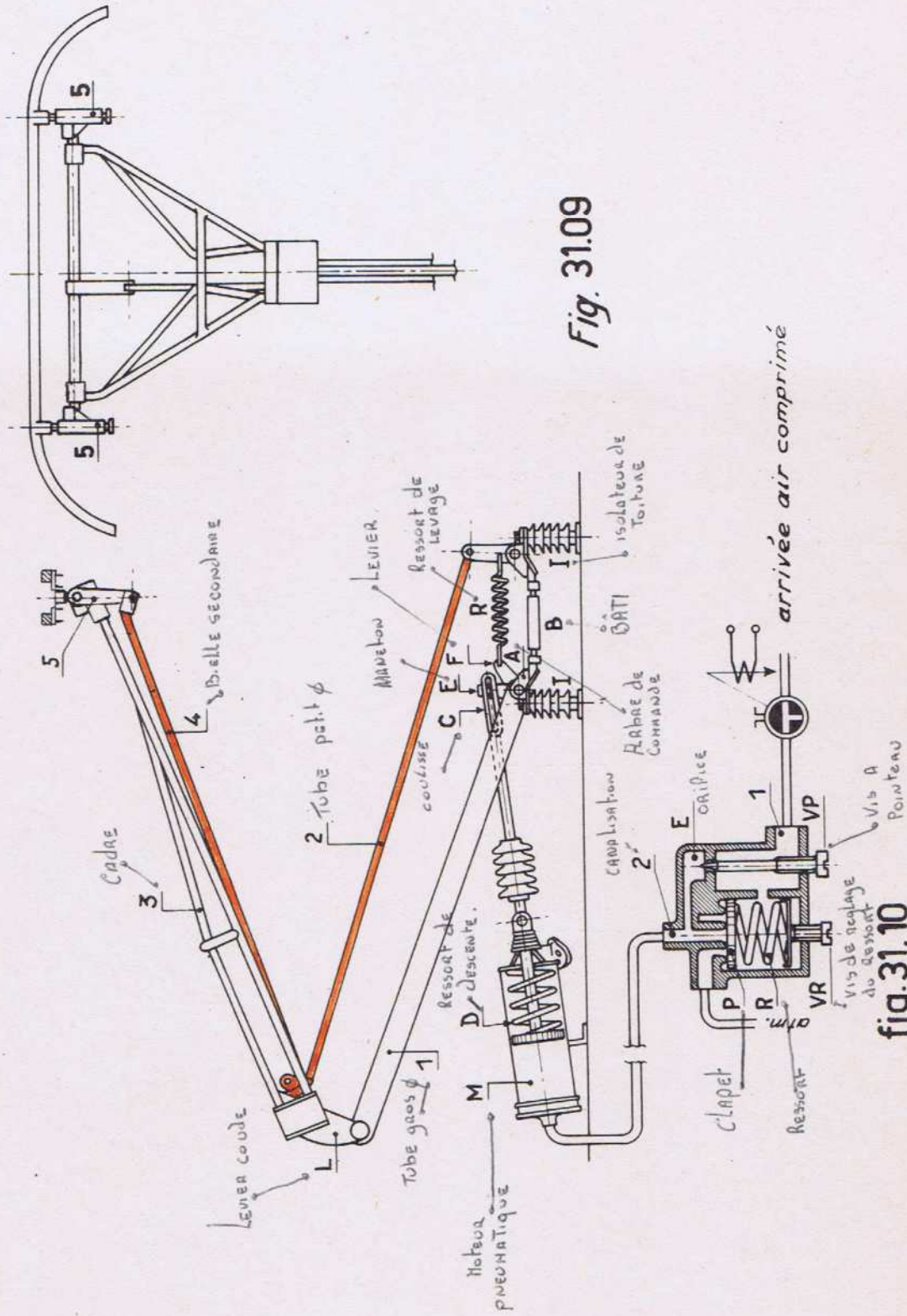


fig. 30.08.

124.20
30. uo37

Voiture I
Voiture II
 ◯ → accouplement pour fil de train
 ◯ → accouplement pour fil de liaison.



Fil de contact

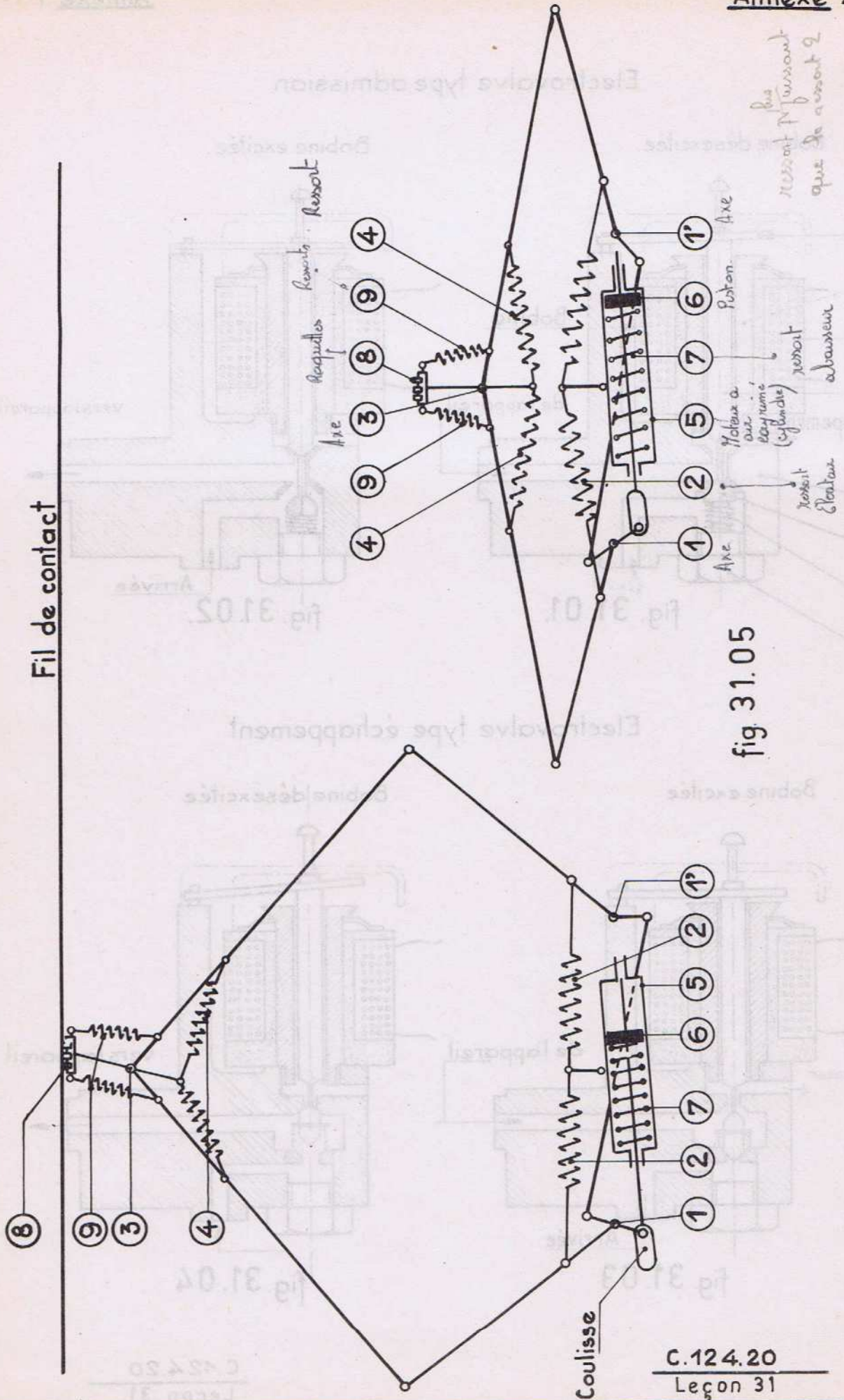


fig 31.05

*Plus
ressort p'fournant
que le ressort 2*

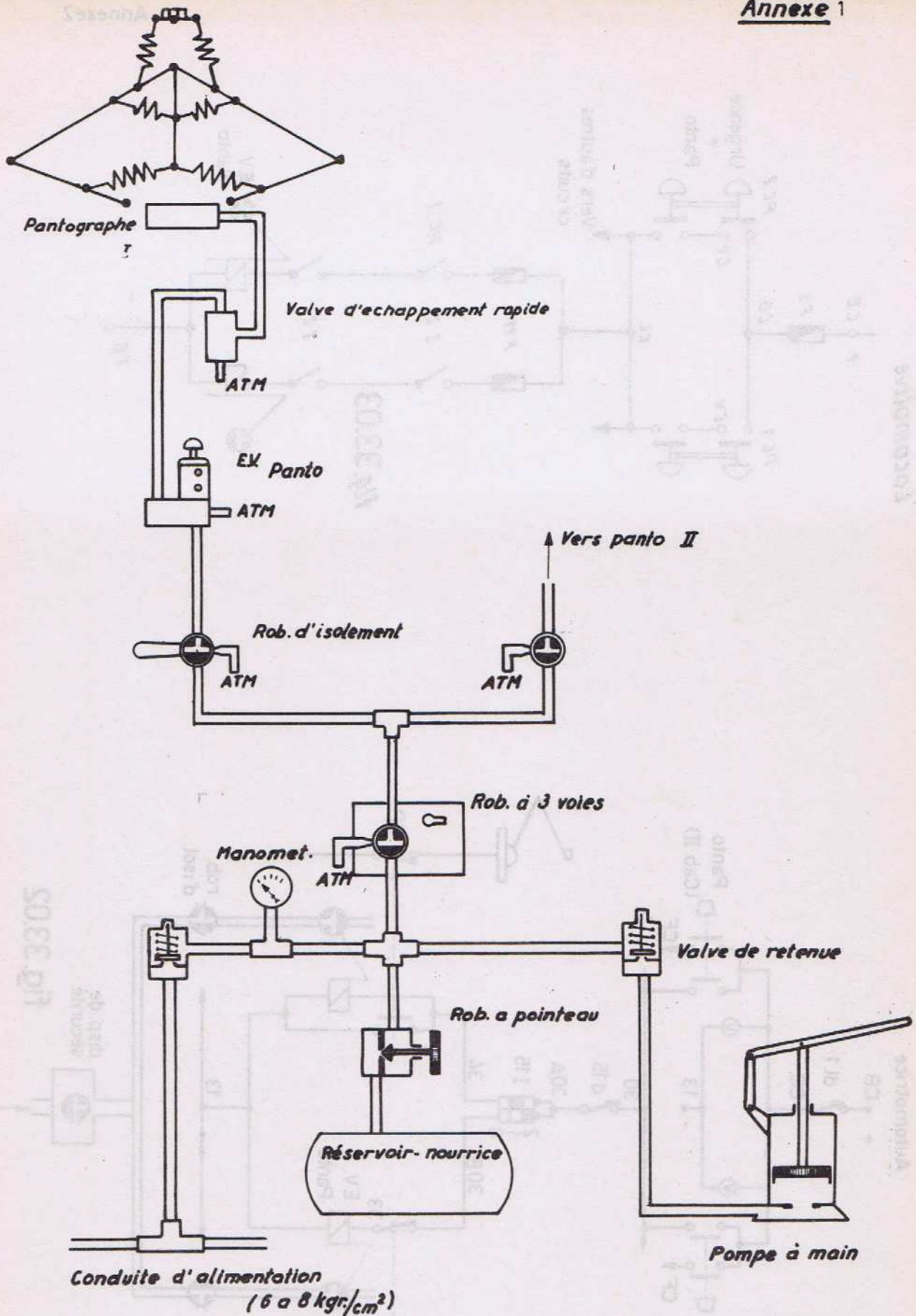


fig. 33.01

Montée

Descente

1^{ere} PHASE RAPIDE.

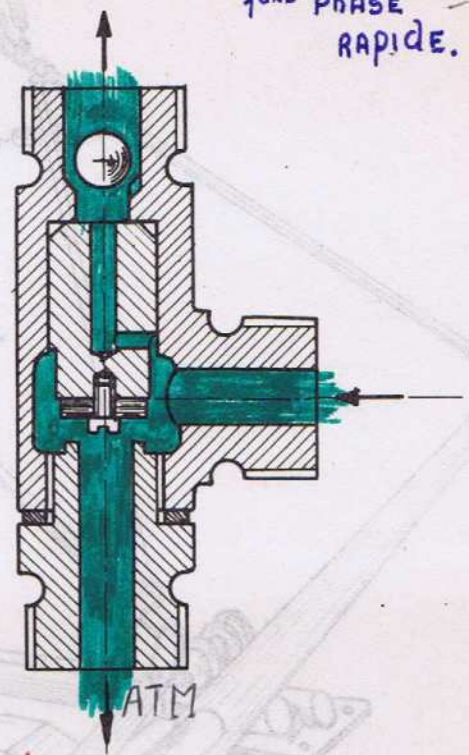
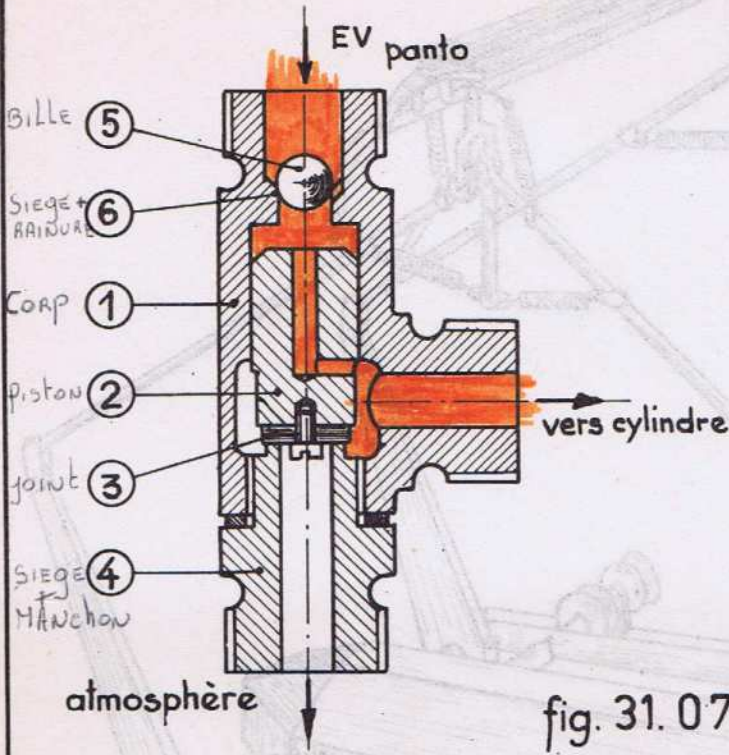
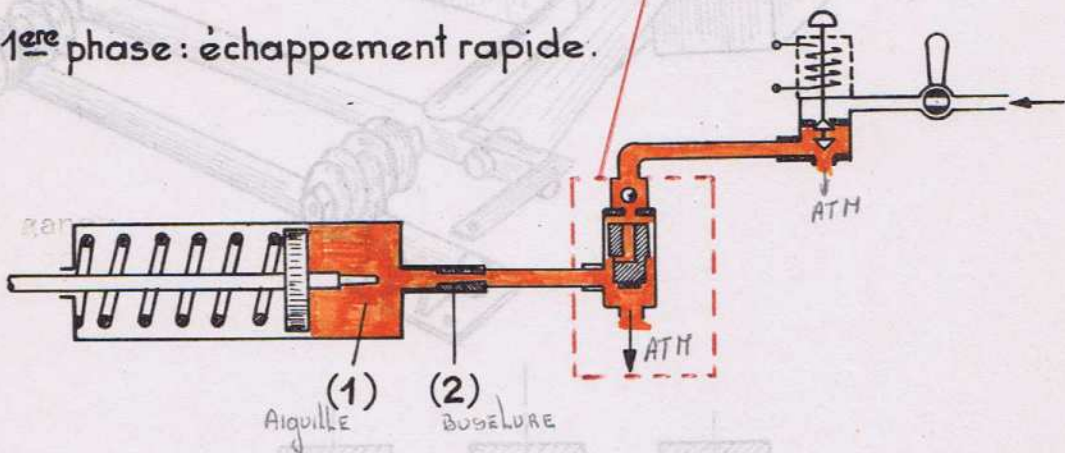


fig. 31.07

1^{ere} phase : échappement rapide.



2^e phase : ralentissement

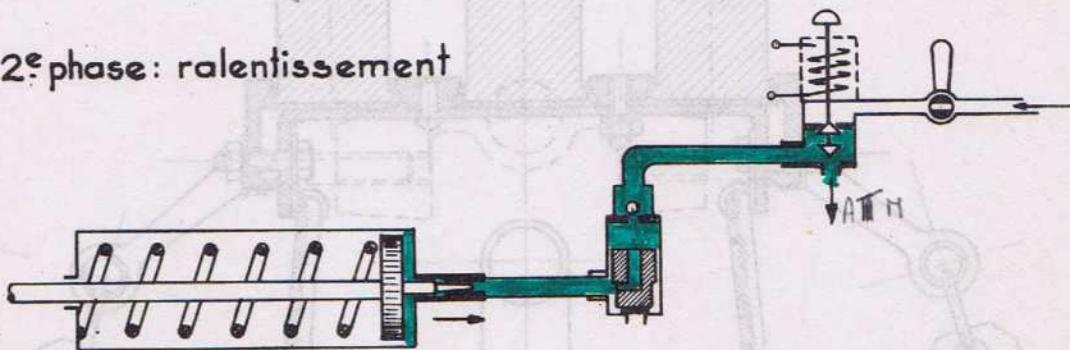


fig. 31.08

Tuyau

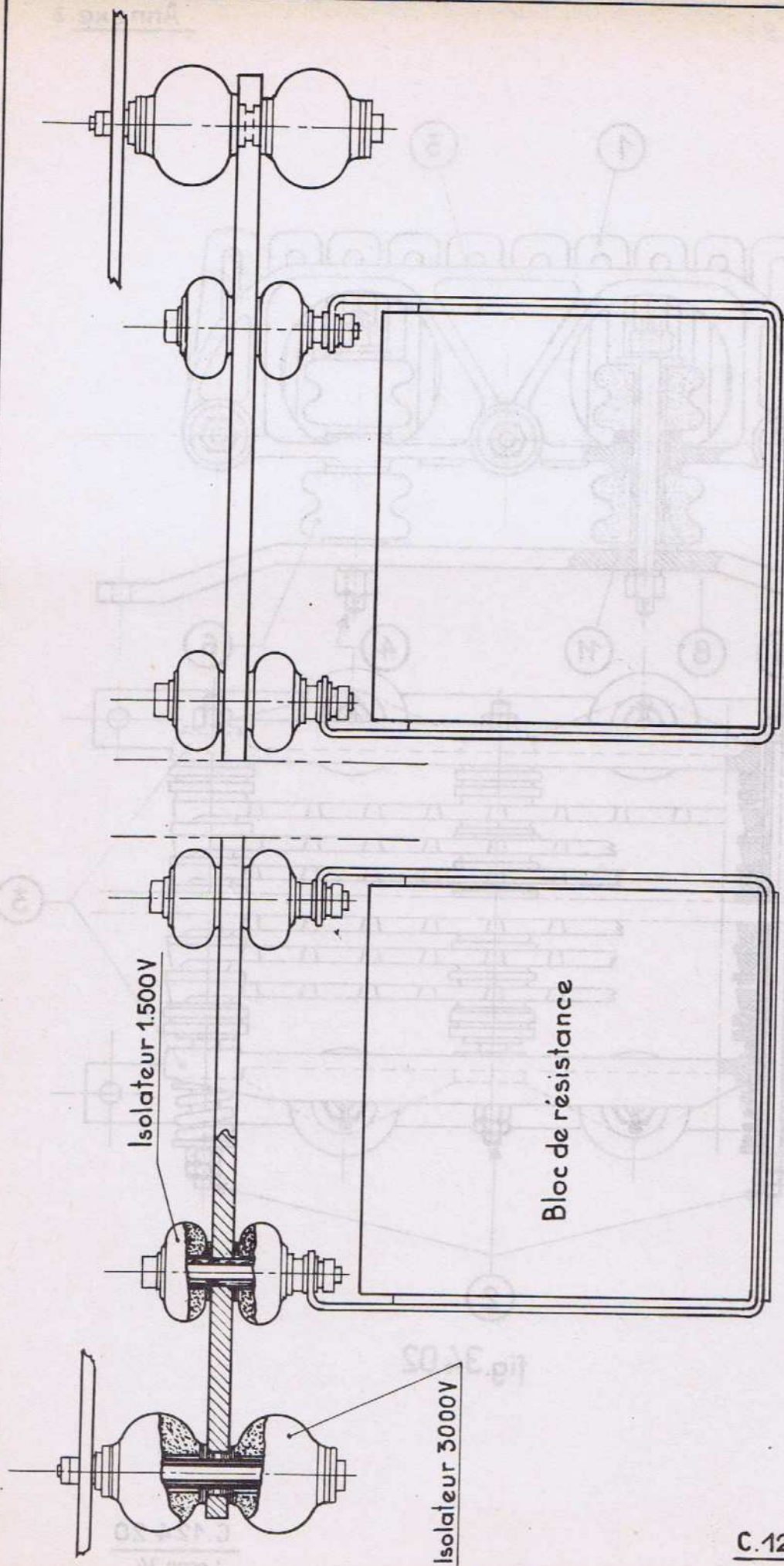


fig. 34.01

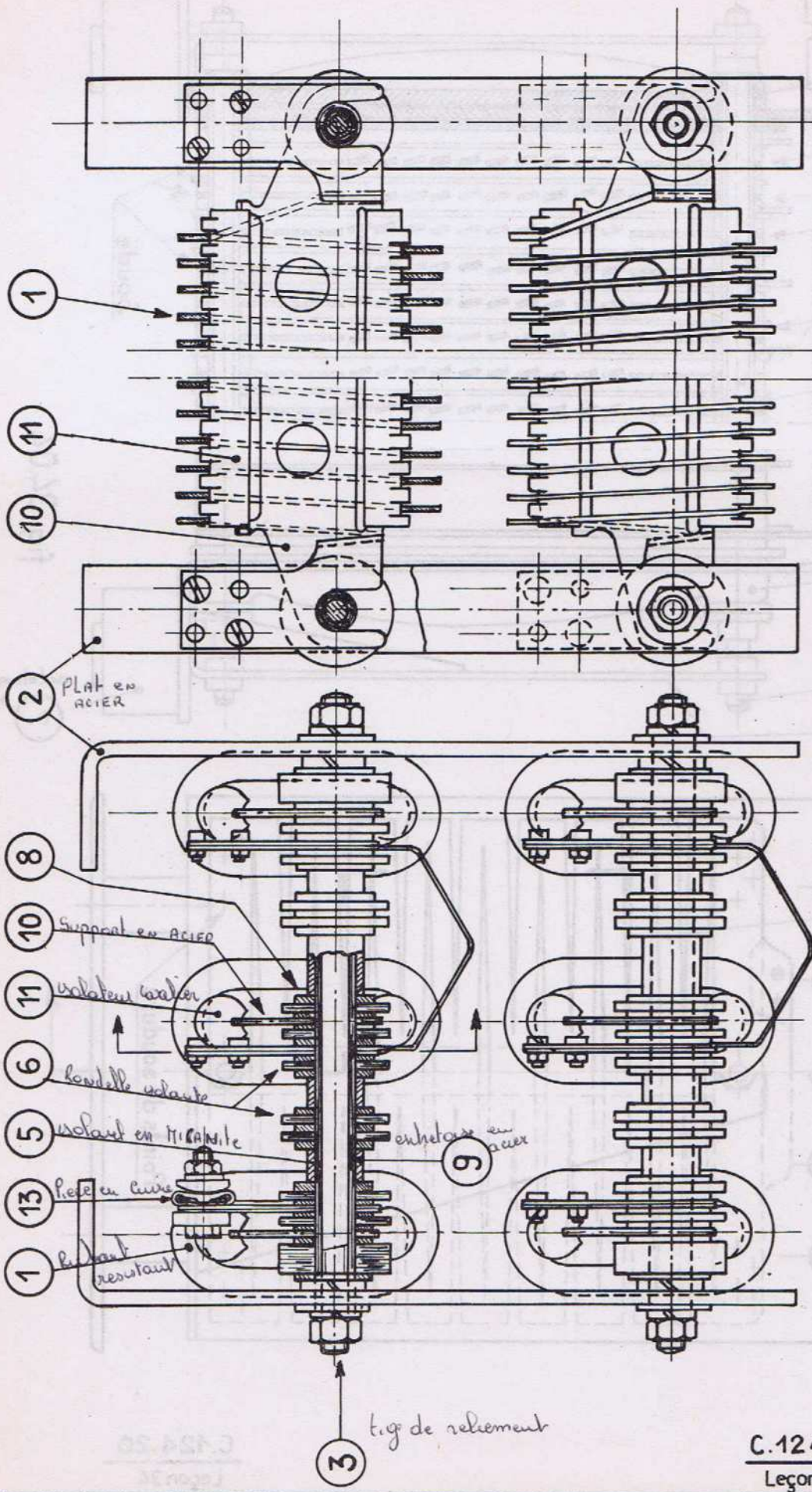


fig. 34.03

Locomotive

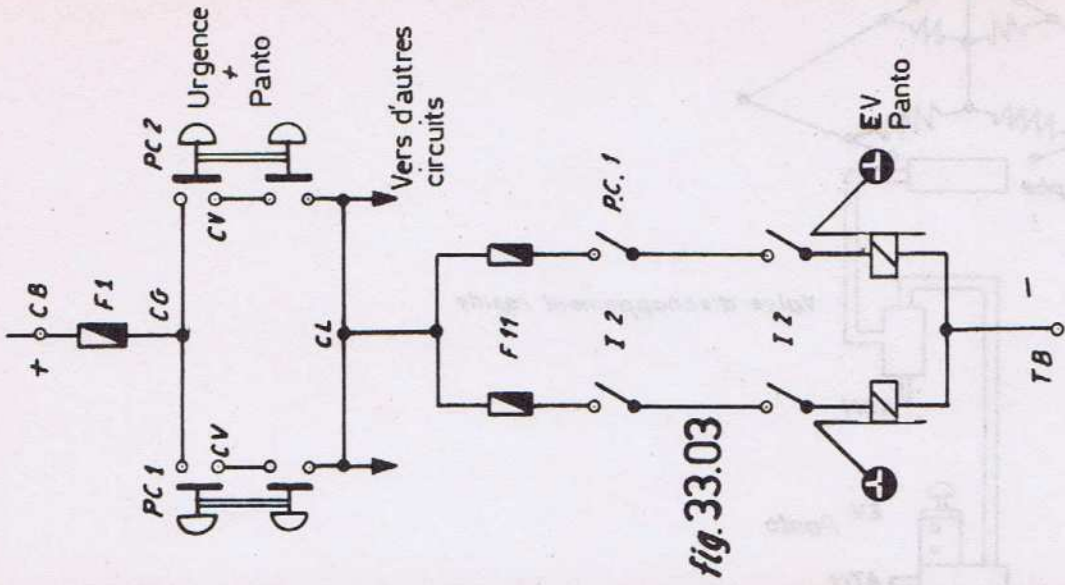


fig. 33.03

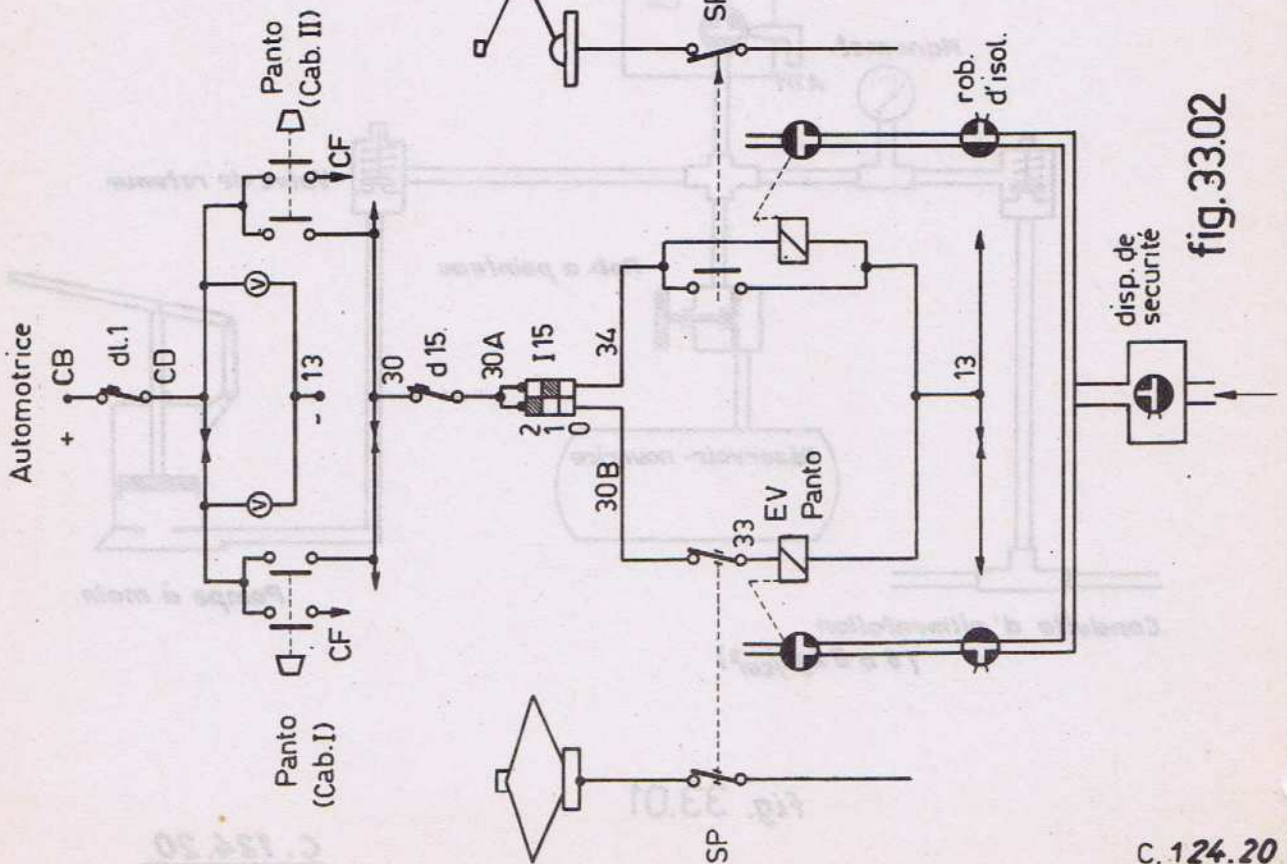


fig. 33.02

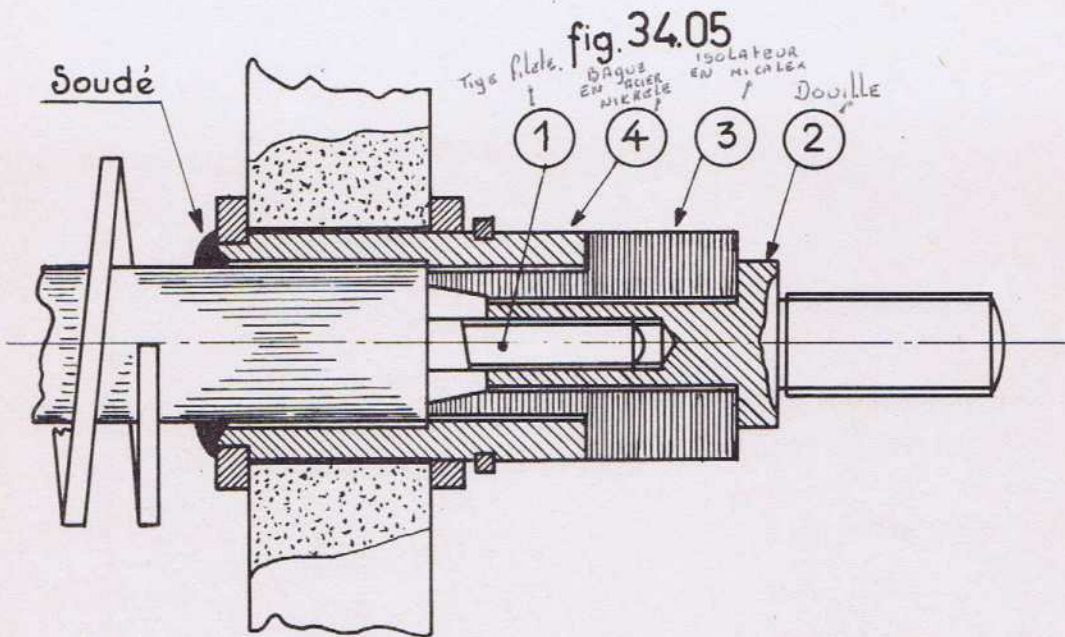
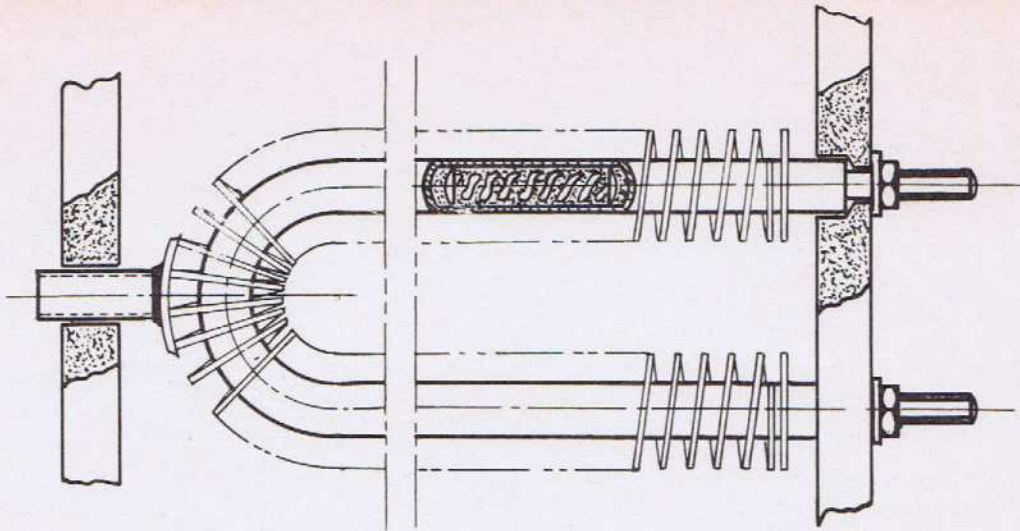
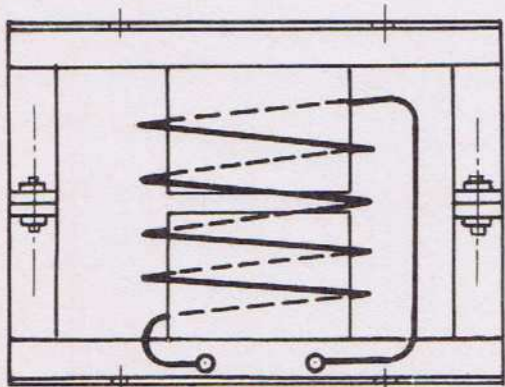
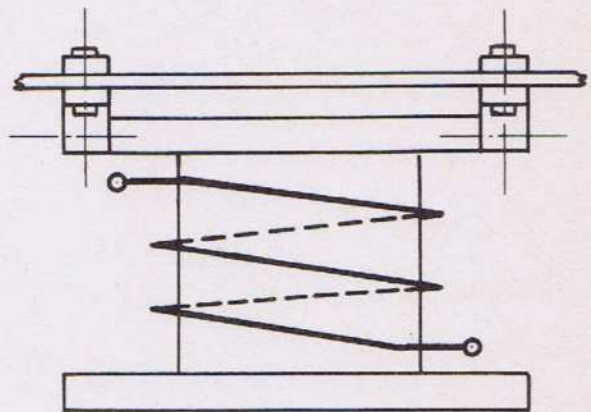


fig 34.06



shunt inductif LOCOMOTIVE.

fig. 34.07



Shunt inductif A.M

fig. 34.08

Exon Type 29

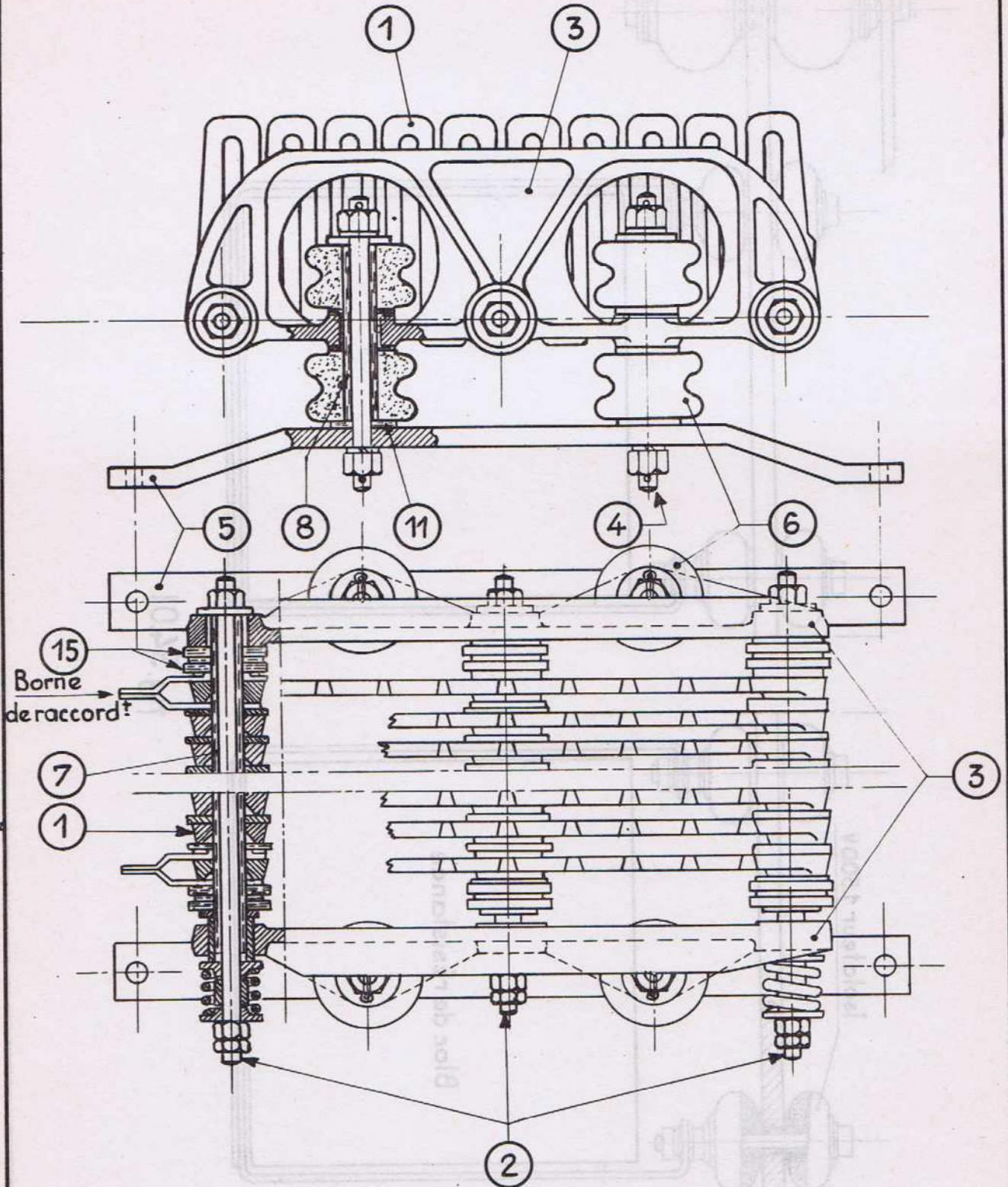


fig. 34.02

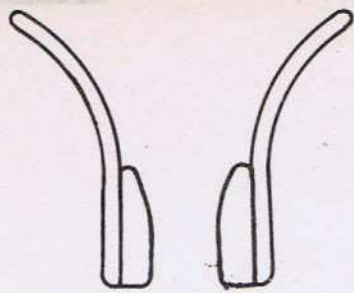


fig.35.01



fig.35.03

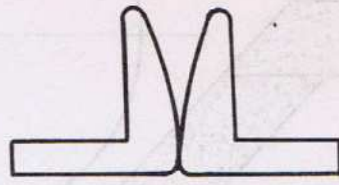


fig 35.04

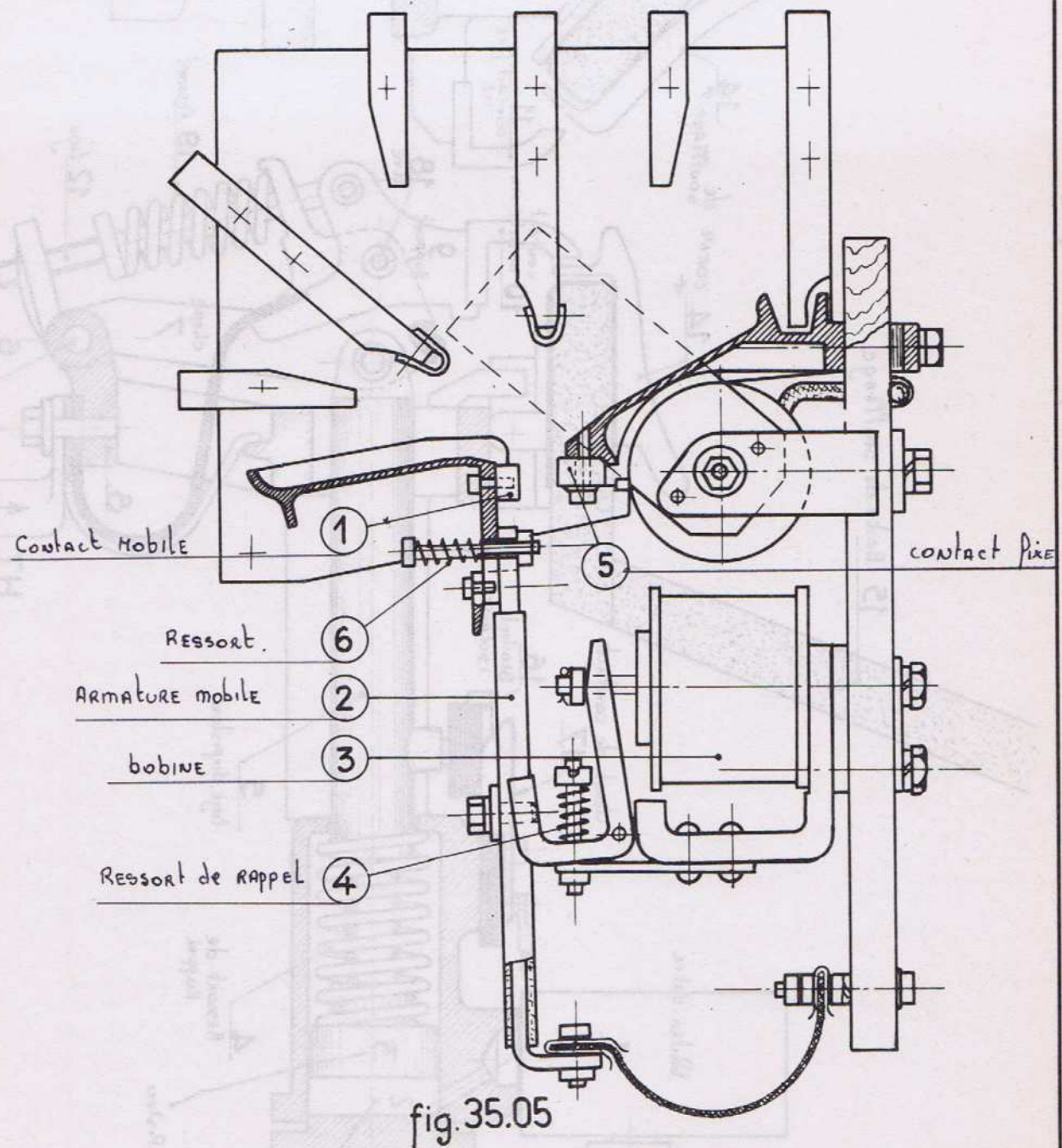


fig.35.05

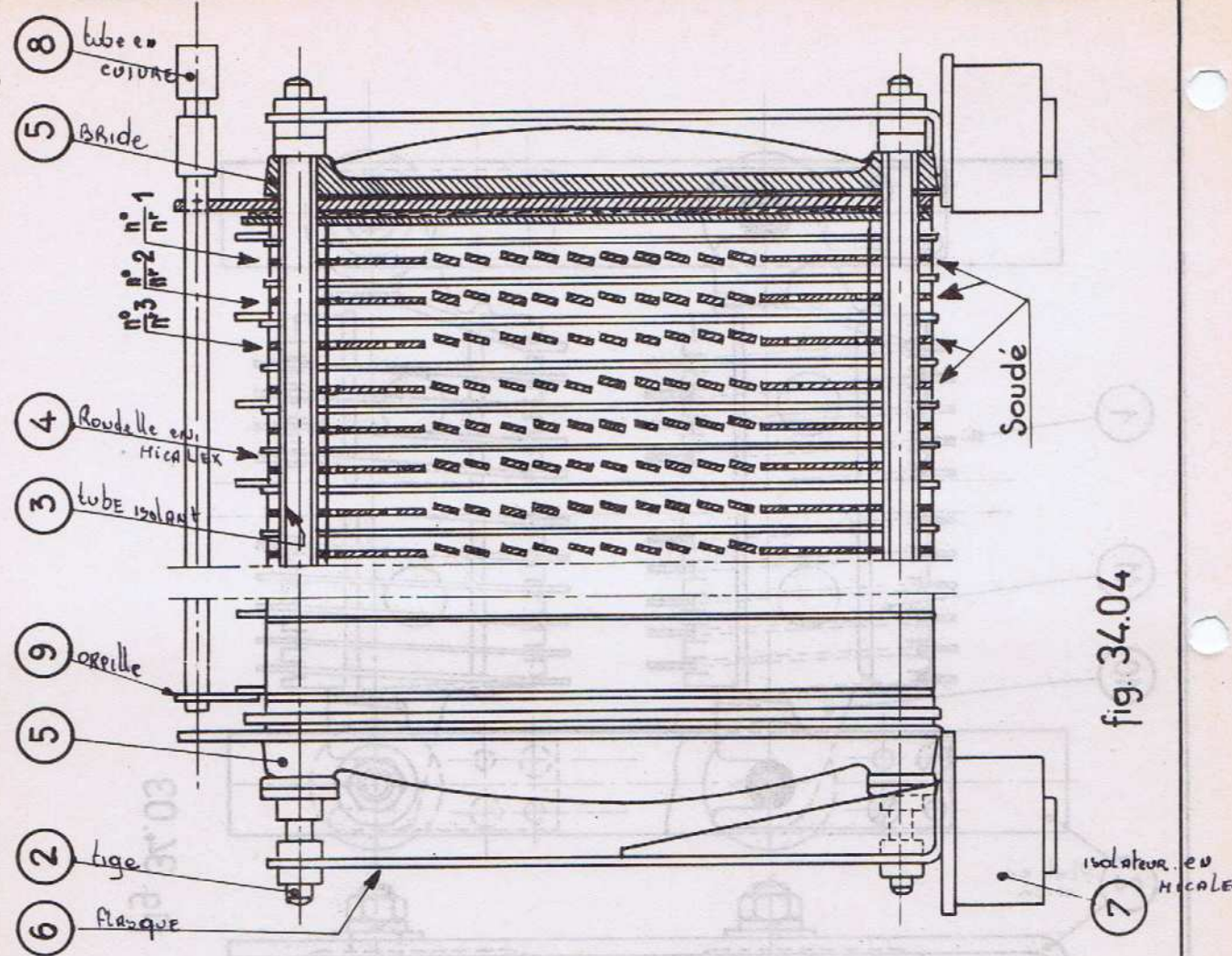
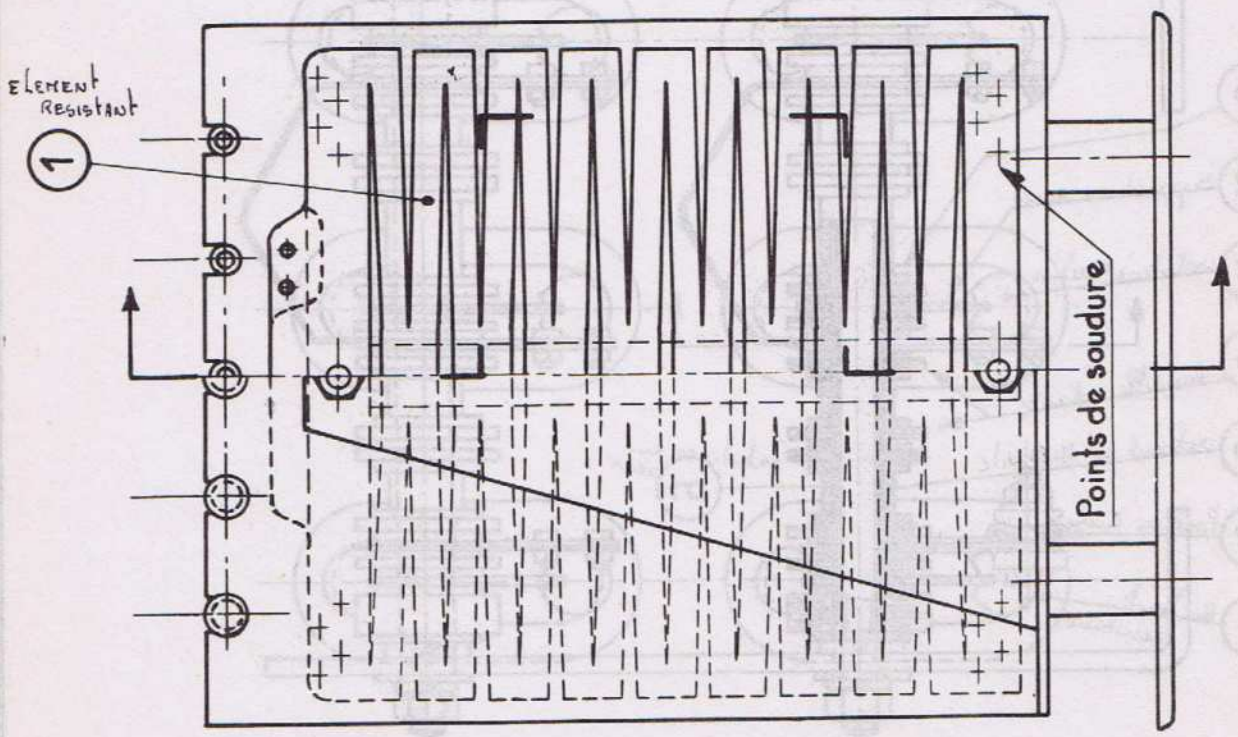
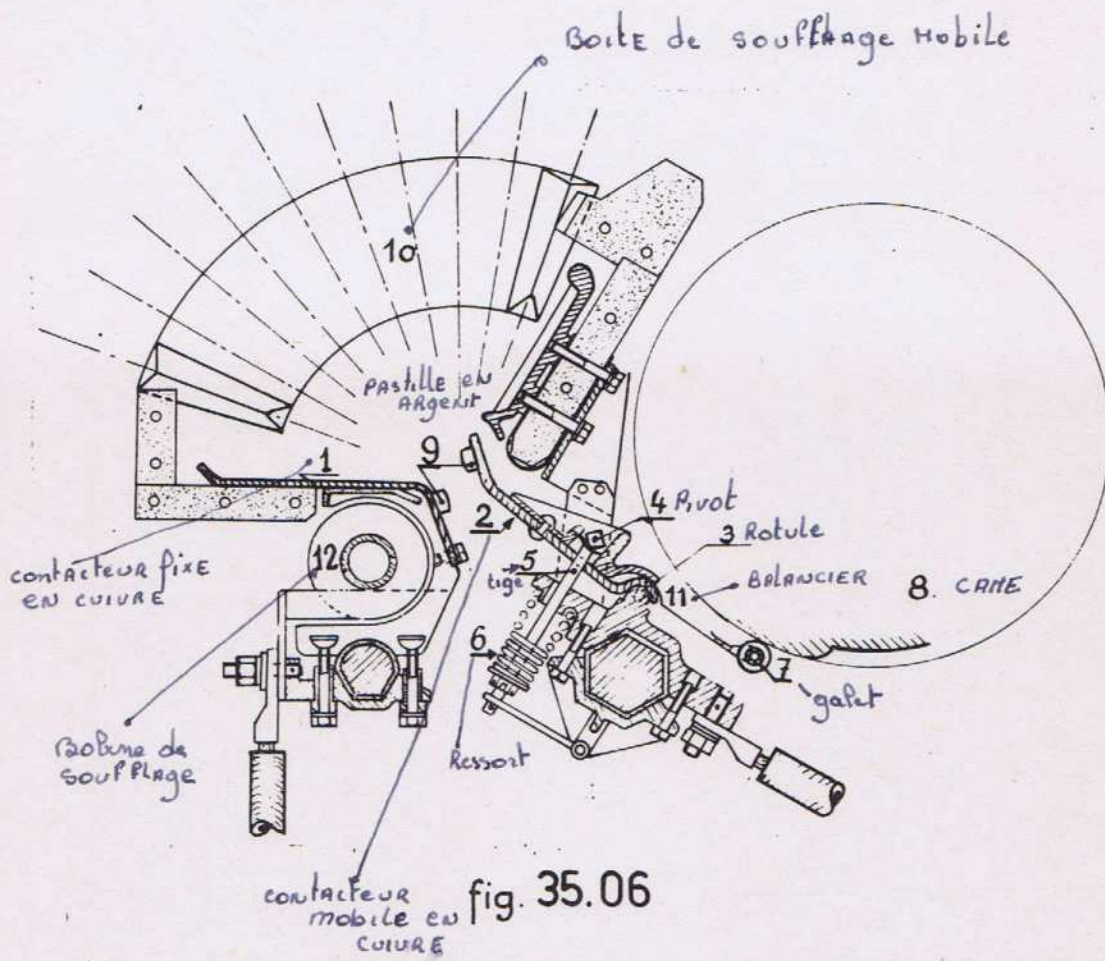


fig. 34.04





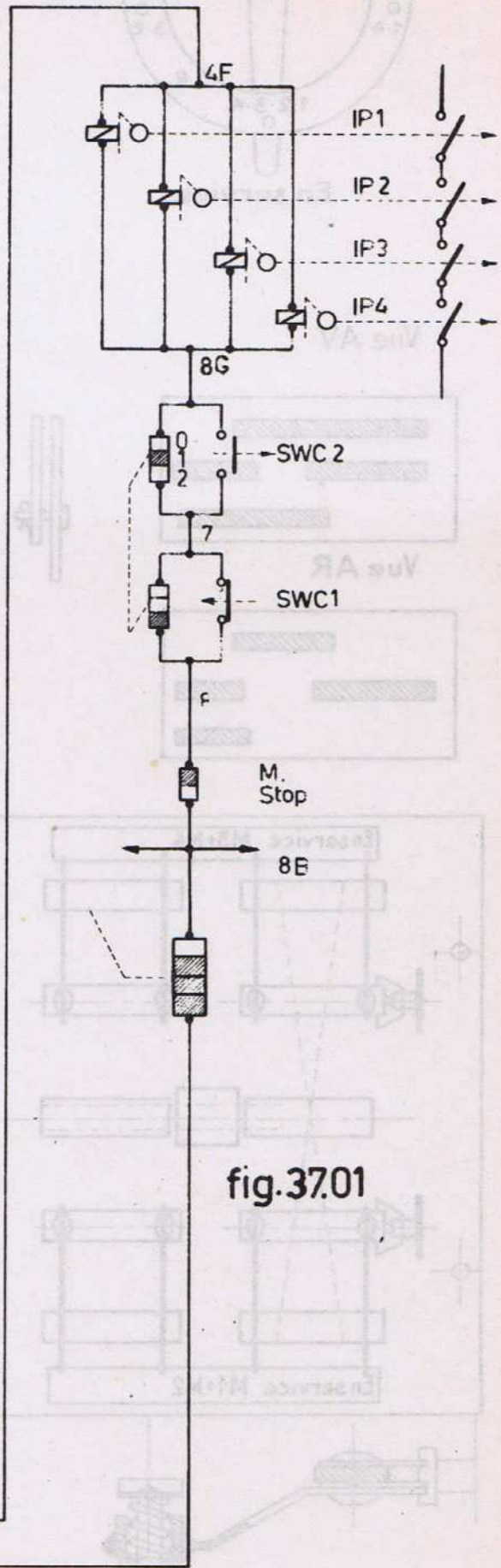
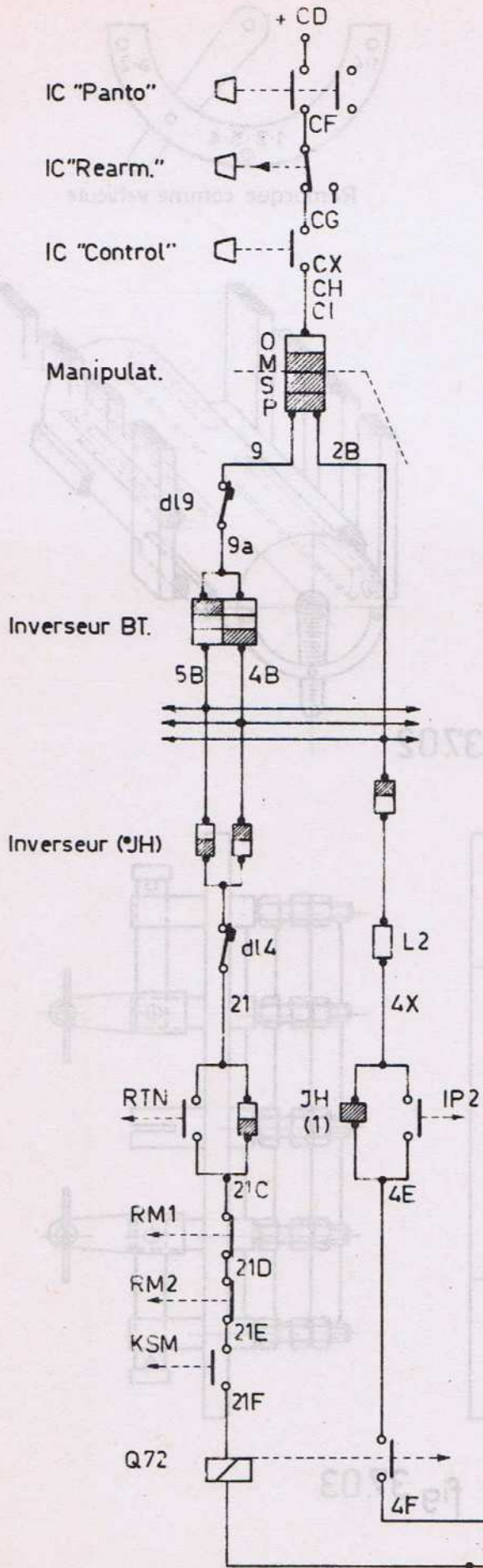


fig.37.01

CONTACTEUR ELECTRO PNEUMATIQUE

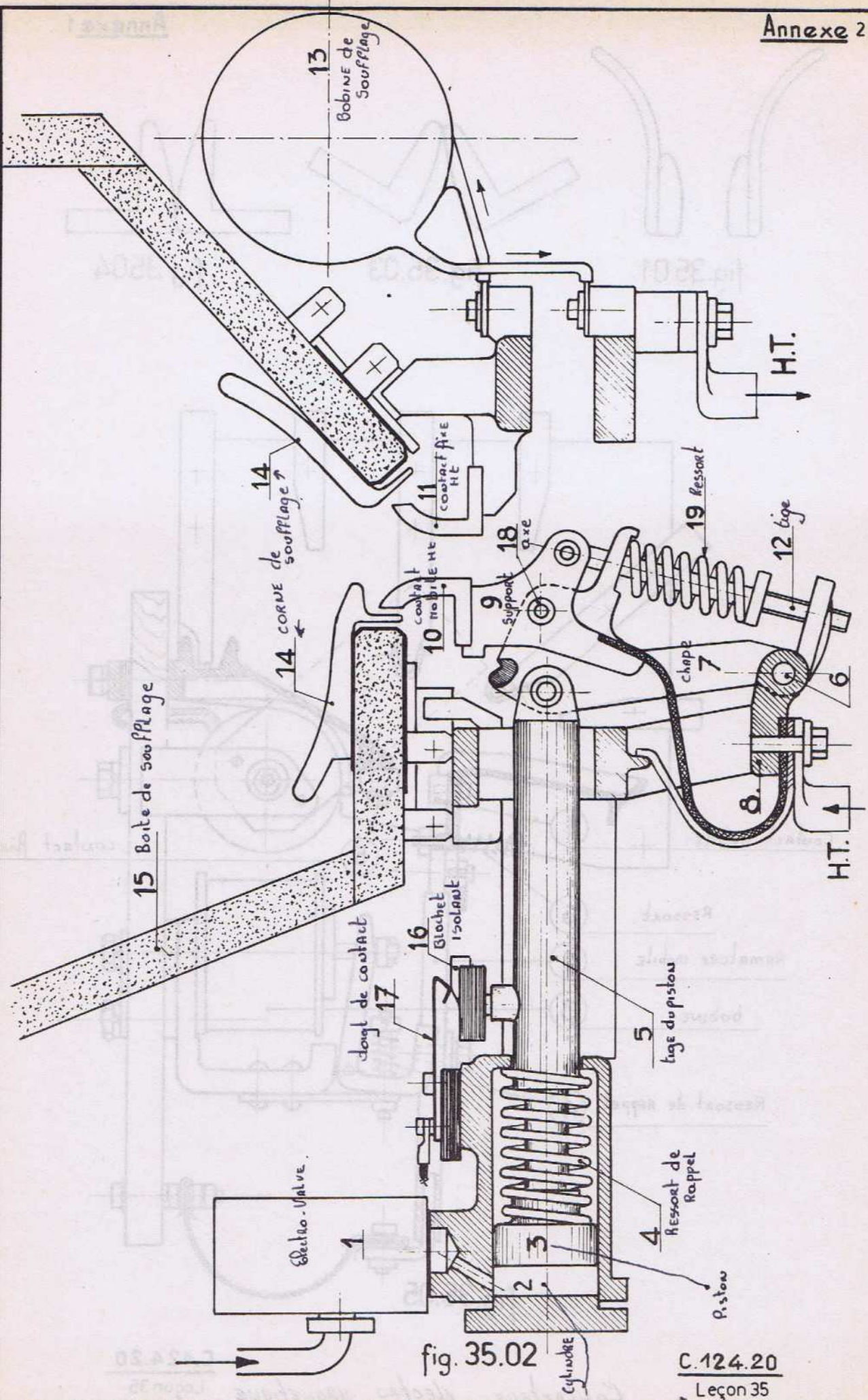
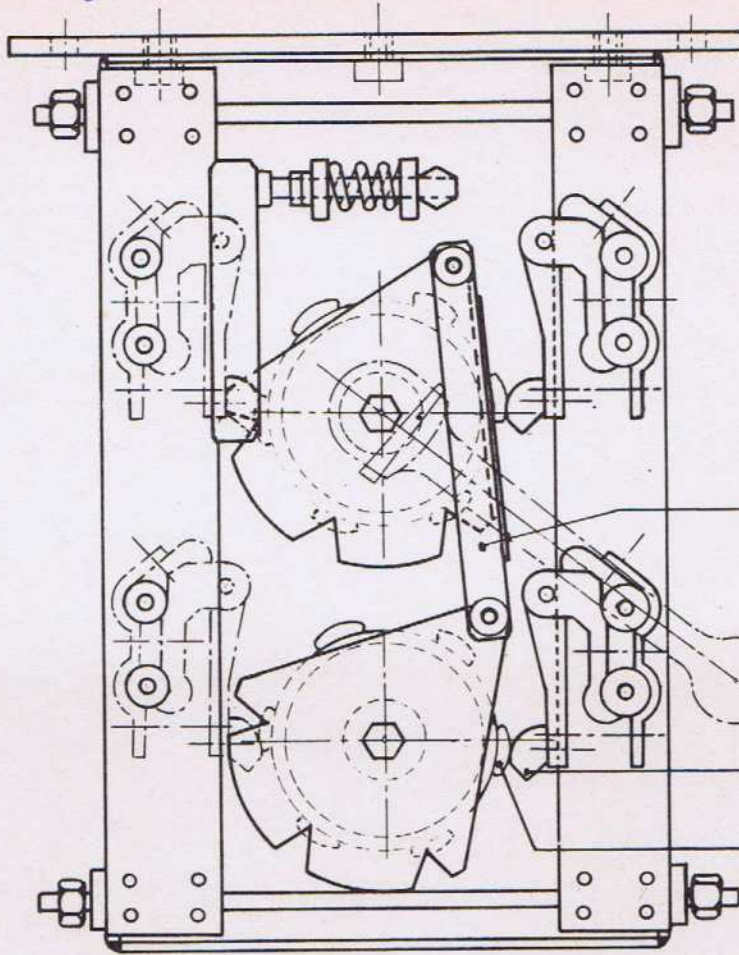


fig. 35.02

C.124.20
Leçon 35

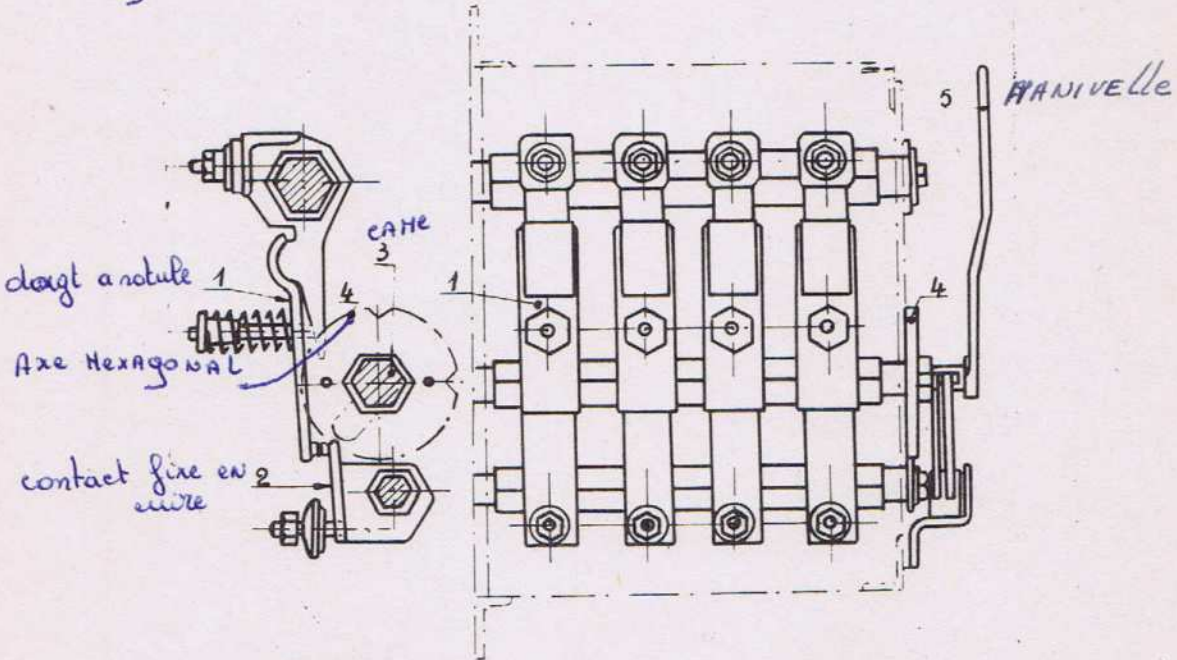
type 29



- ① doigt à rotule
- ② contact fixe EN CUIVRE
- ④ AXE HEXAGONAL
- ③ CAMÉ

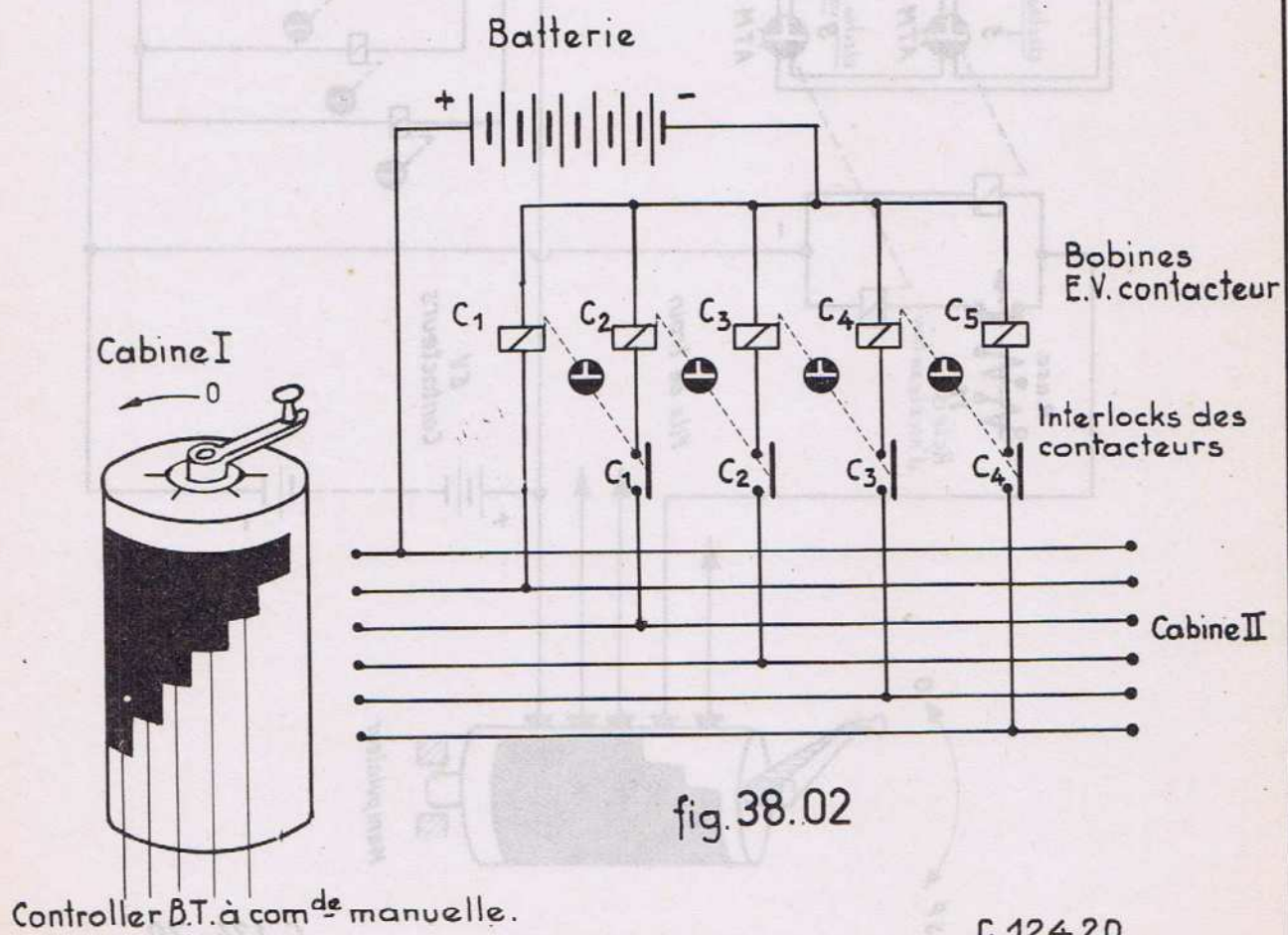
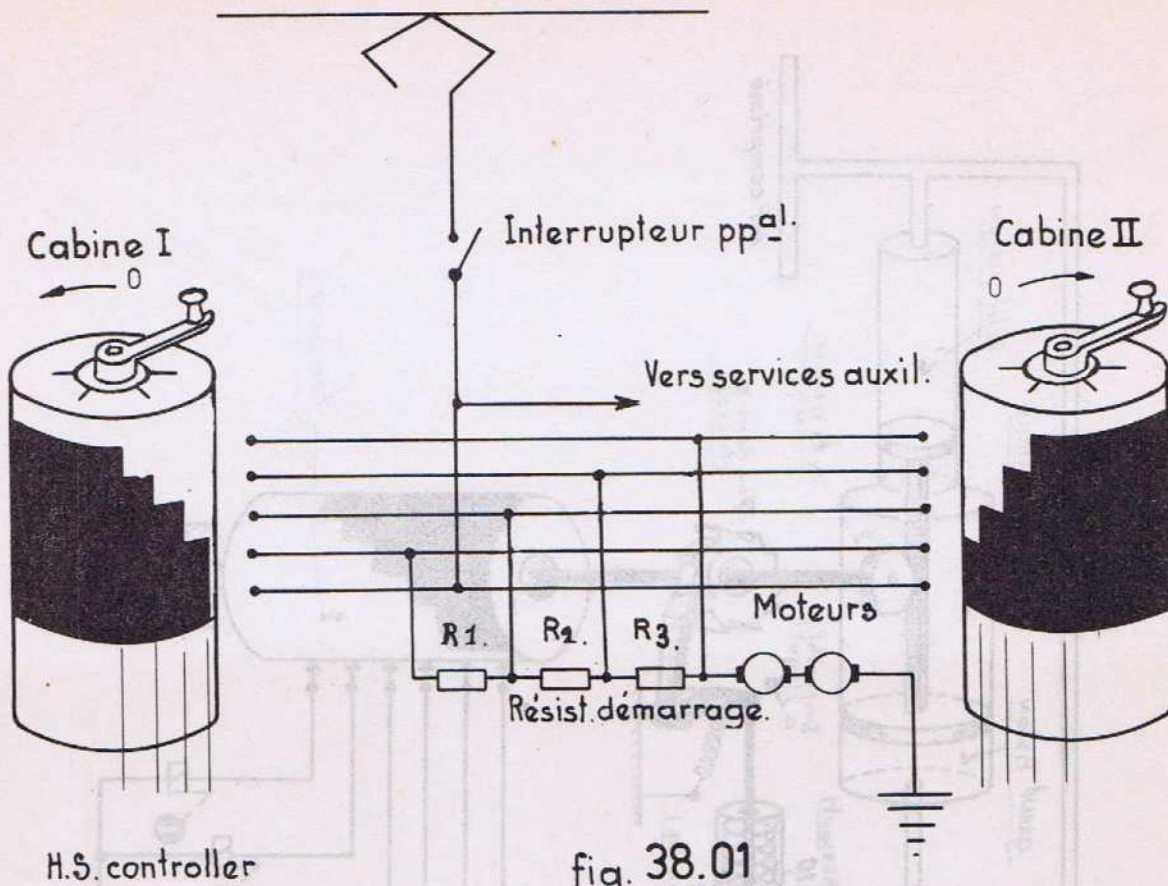
fig. 37.04

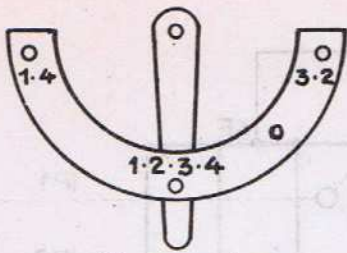
type 22-23-25



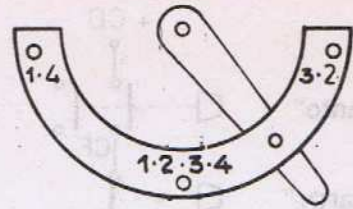
- doigt à rotule 1
- AXE HEXAGONAL 4
- contact fixe en cuivre 2
- CAMÉ 3

fig. 37.05



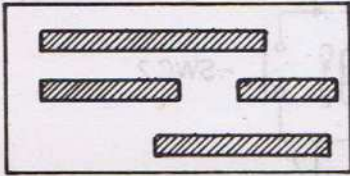


En service



Remorque comme vehicule

Vue AV



Vue AR

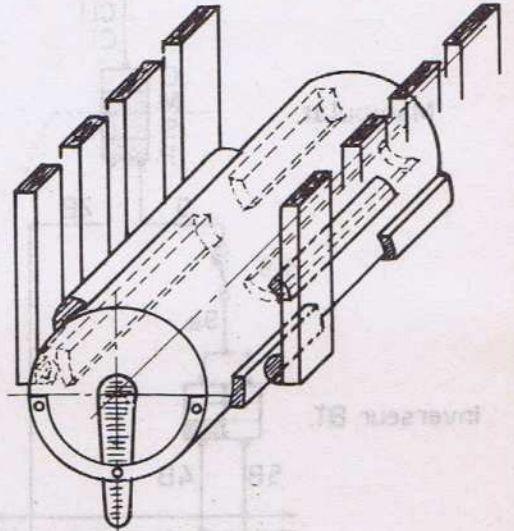
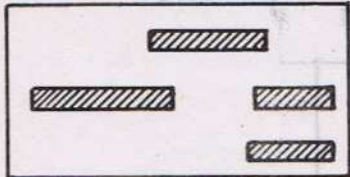


fig 37.02

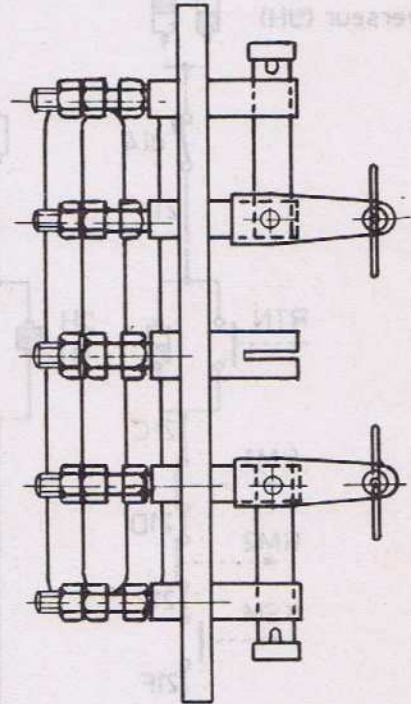
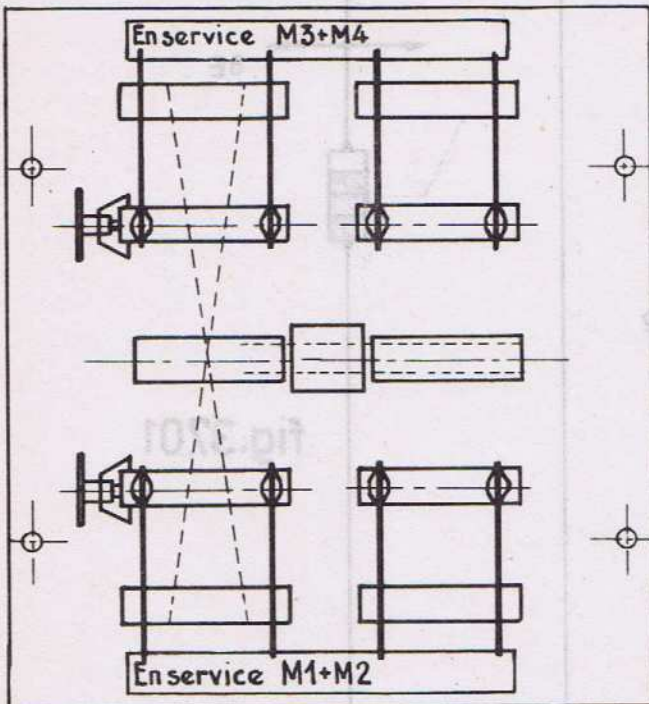
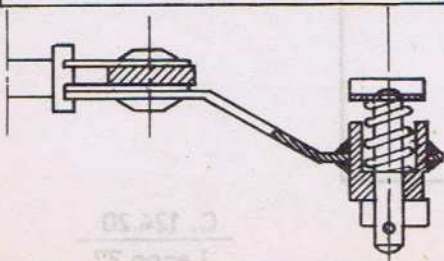
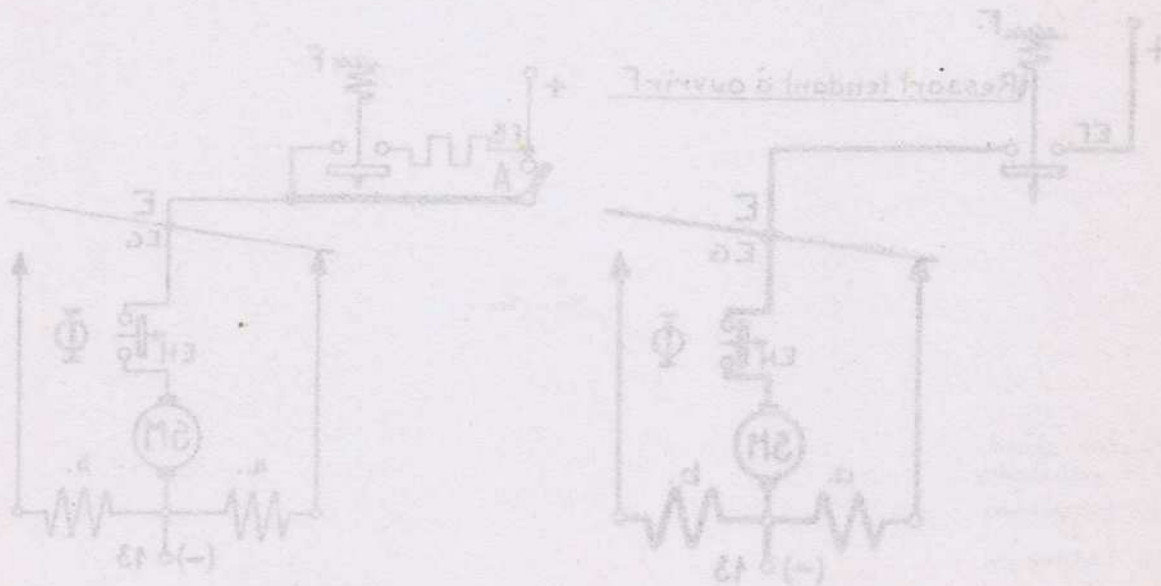
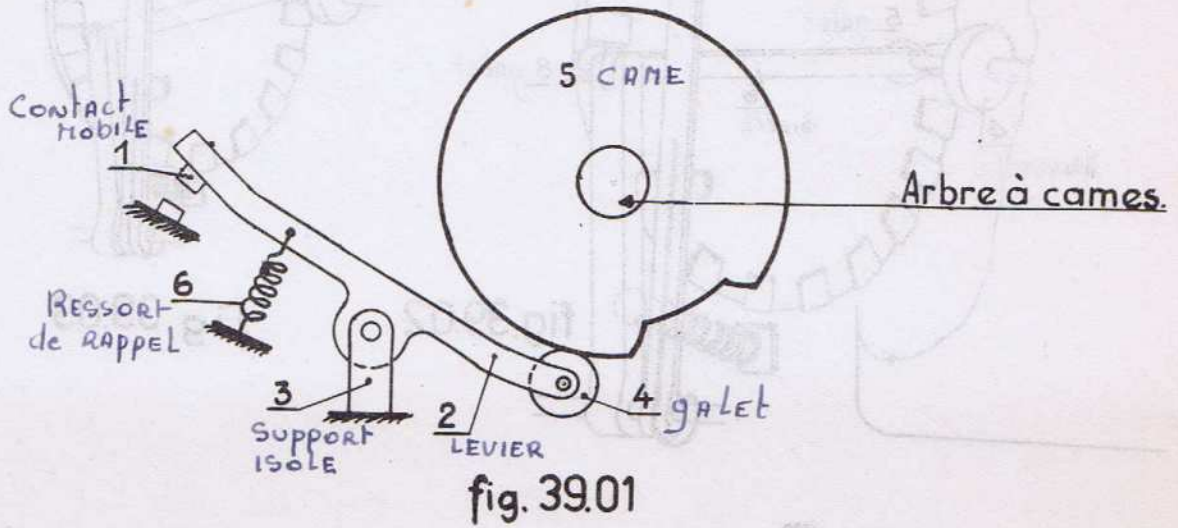


fig.37.03





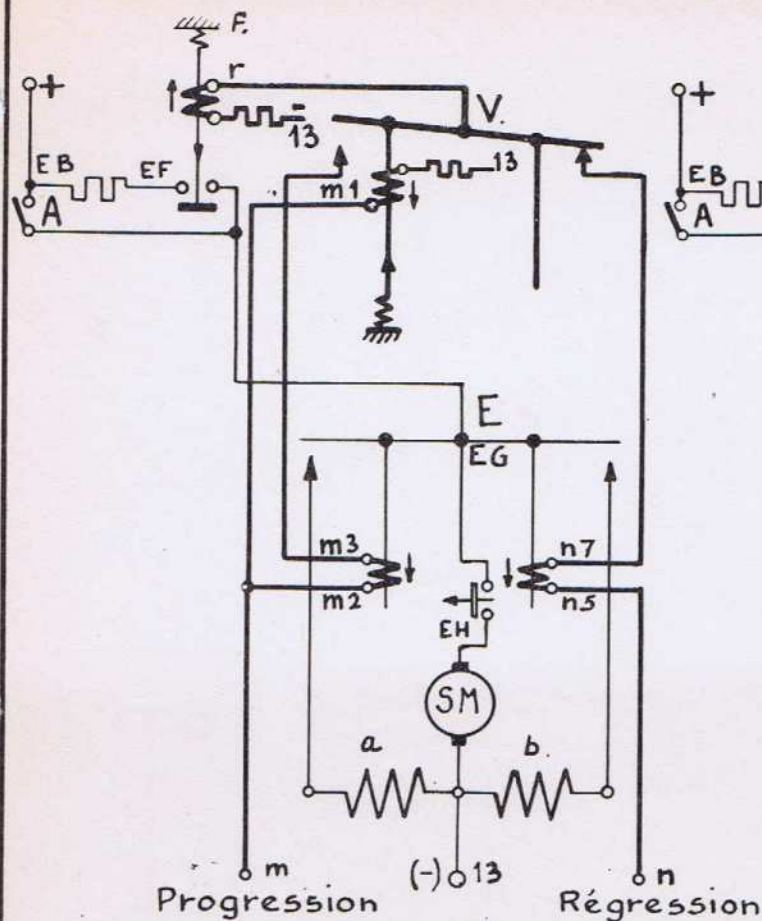


fig. 39.08

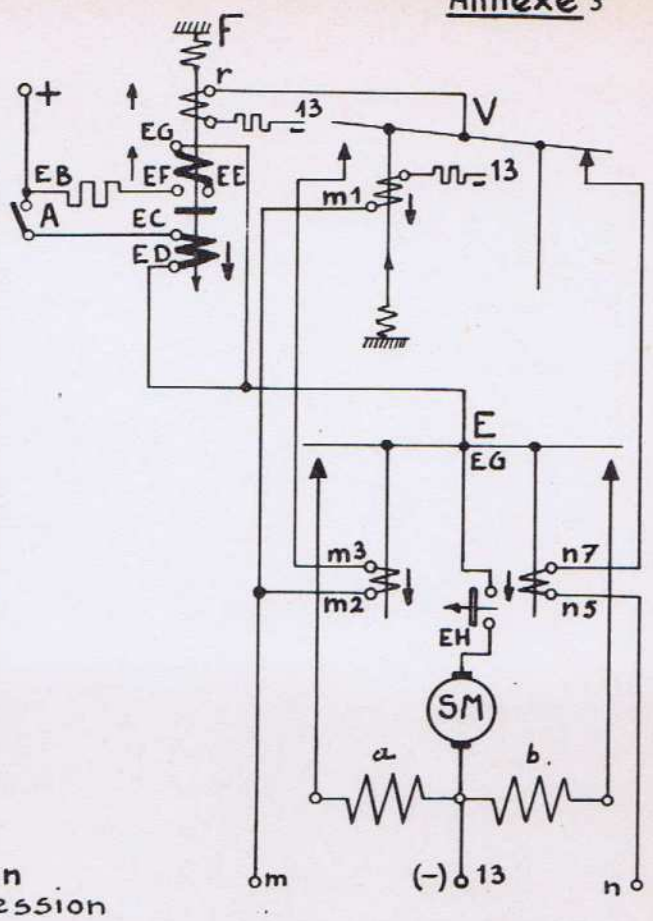


fig 39.09

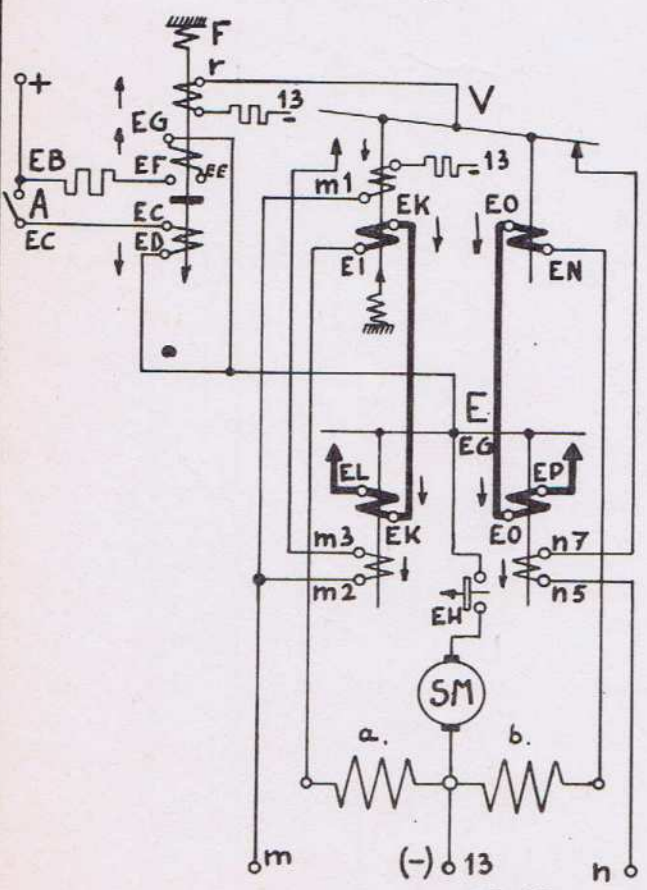


fig. 39.10

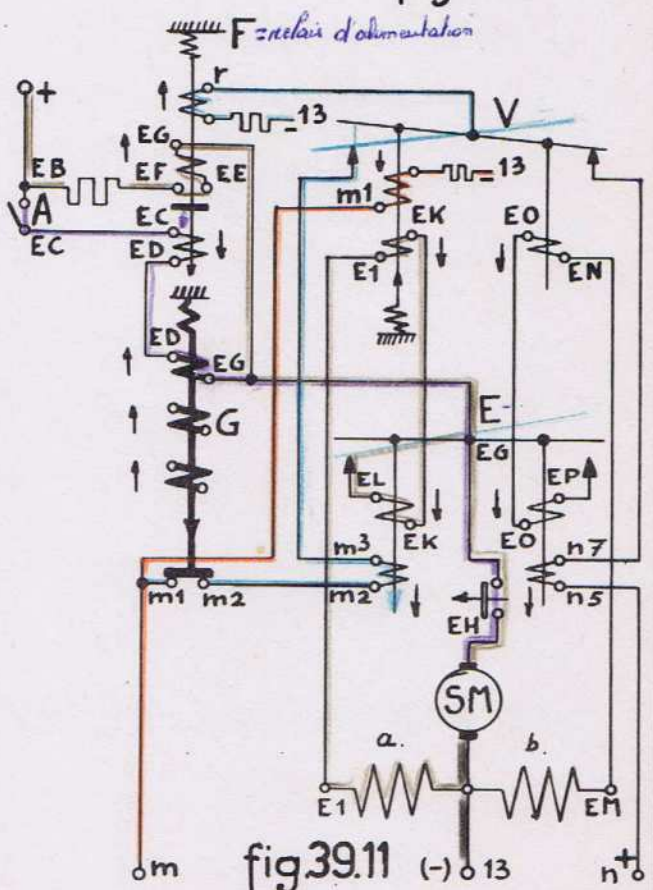


fig. 39.11

- 1
- 2
- 3
- 4

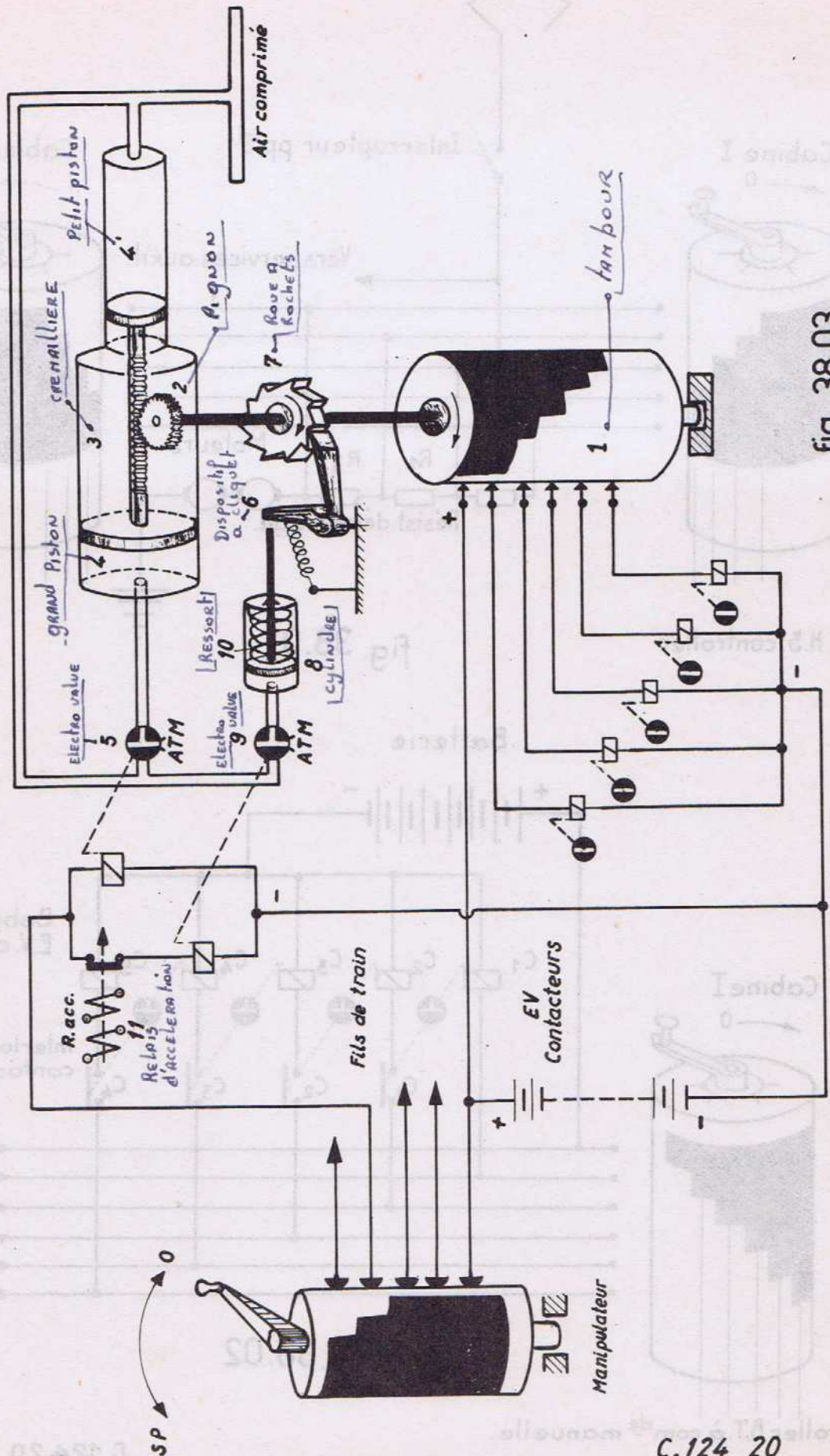


fig. 38.03

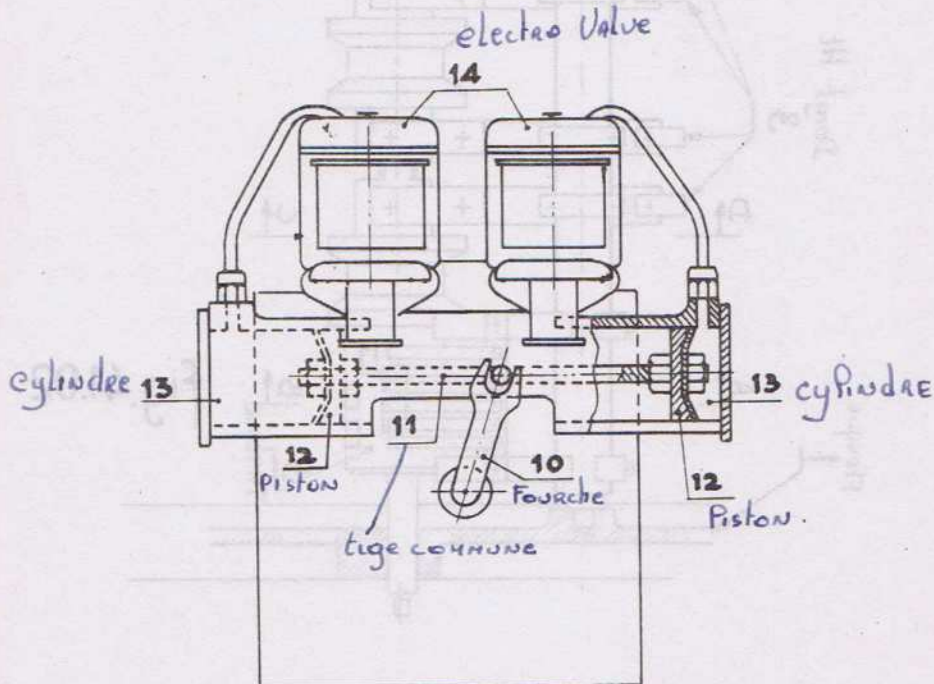
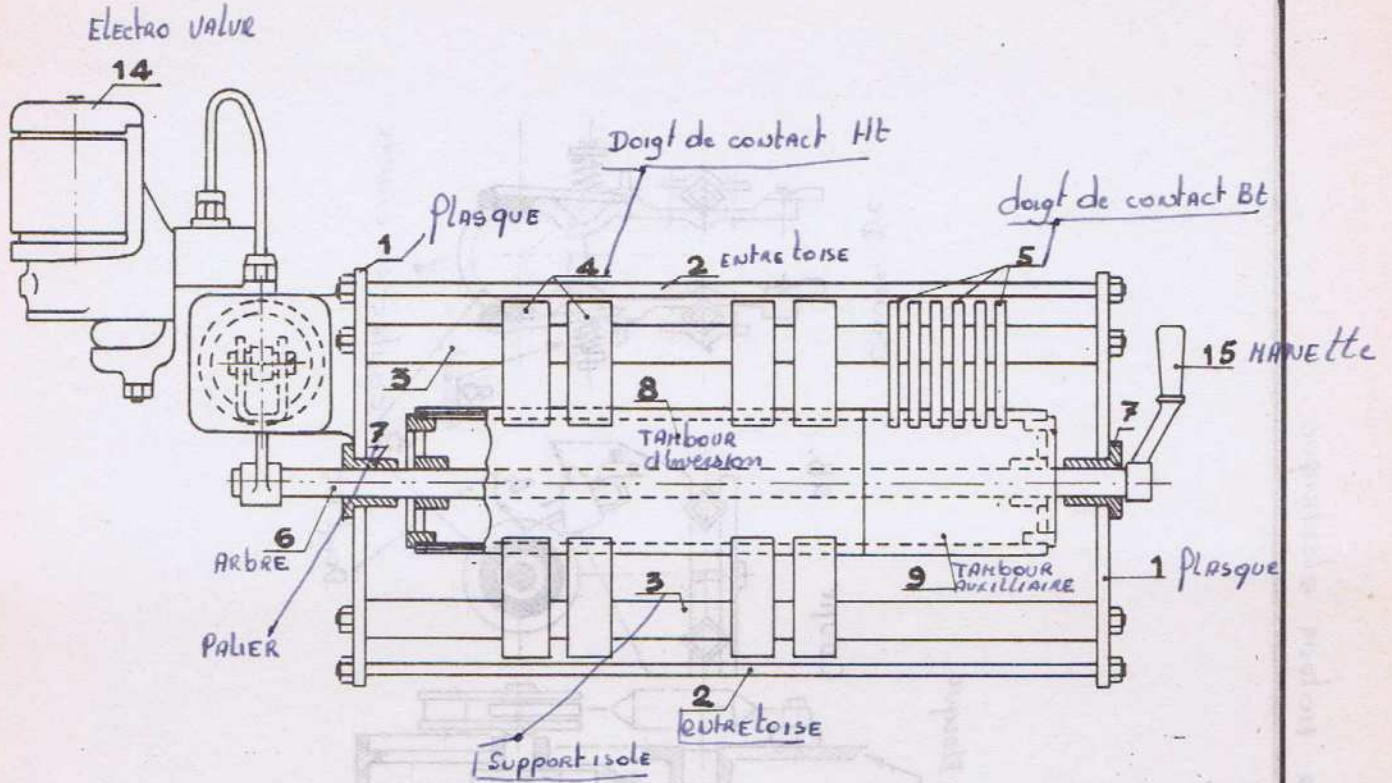


fig.41.01

3 SERVO MOTEUR ELECTRIQUE

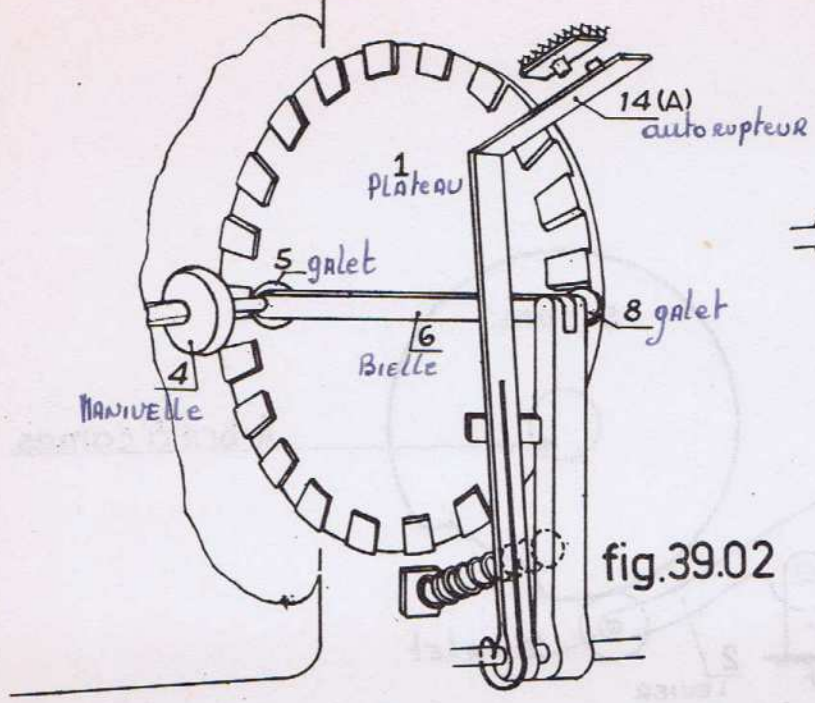


fig.39.02

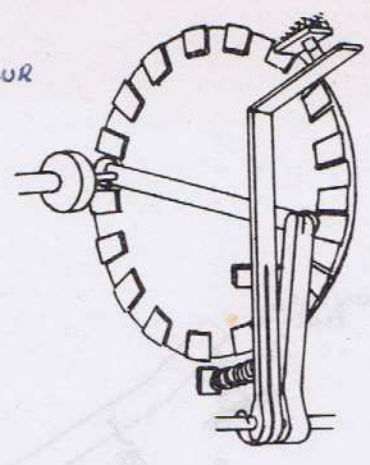


fig.39.03

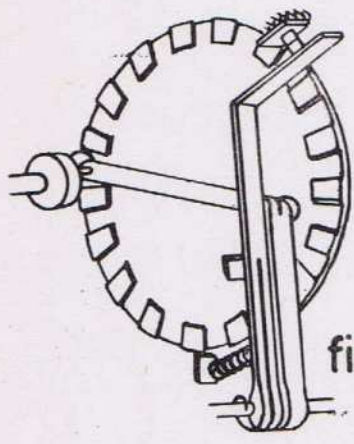


fig.39.04

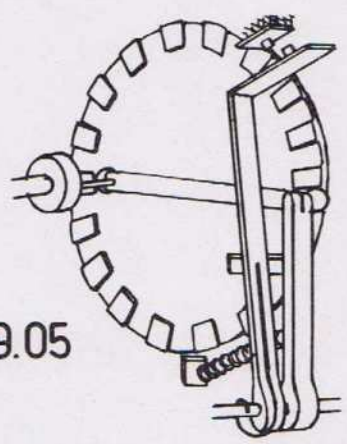
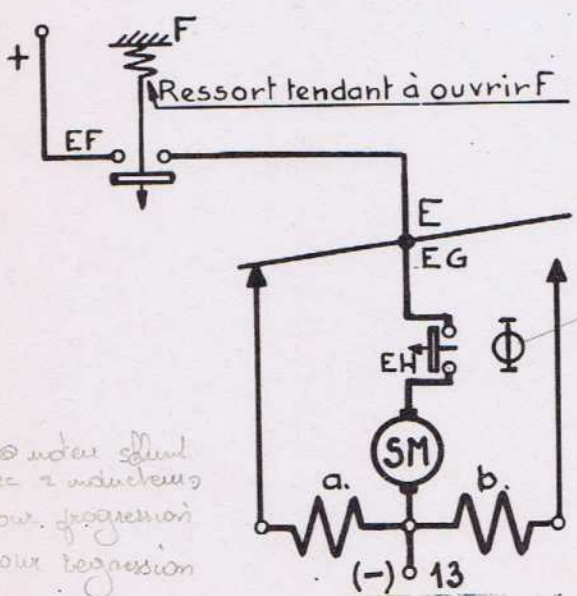


fig.39.05



Sans notes éléct.
avec 2 inducteurs
pour progression
pour regression

fig. 39.06

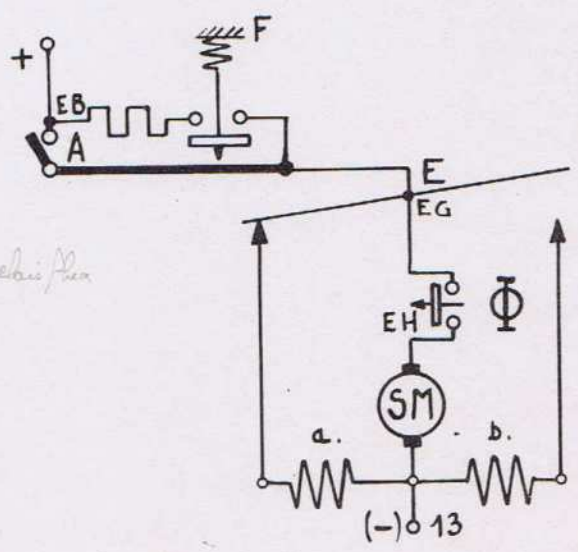


fig.39.07

C.124.20

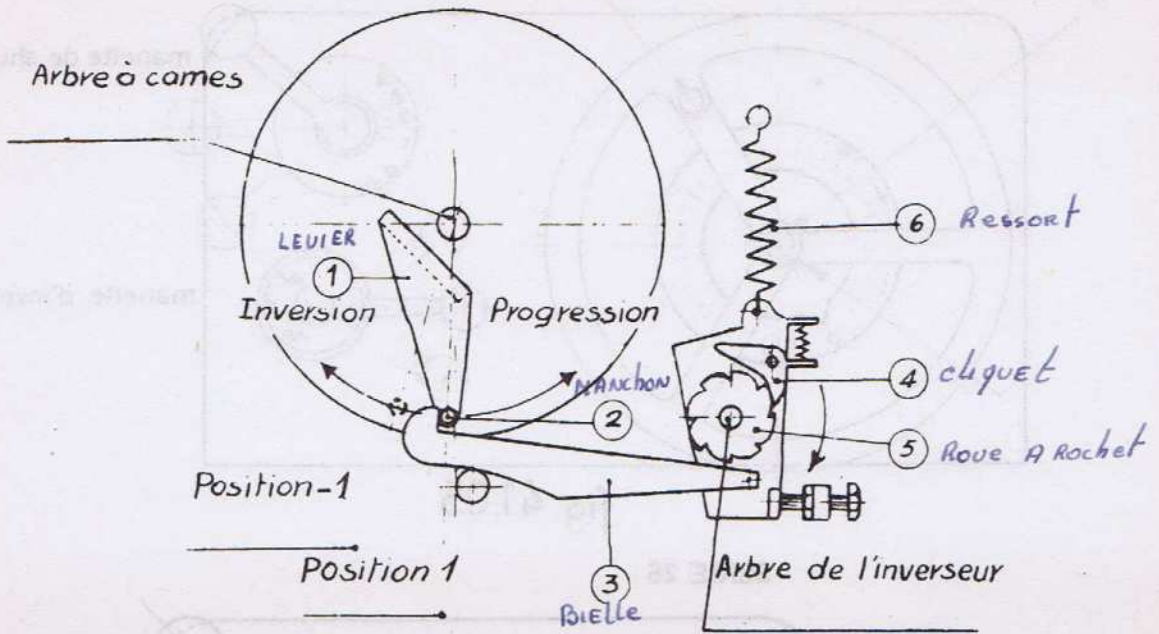


fig.41.03

Ensemble du mécanisme de l'inverseur.

Locomotive

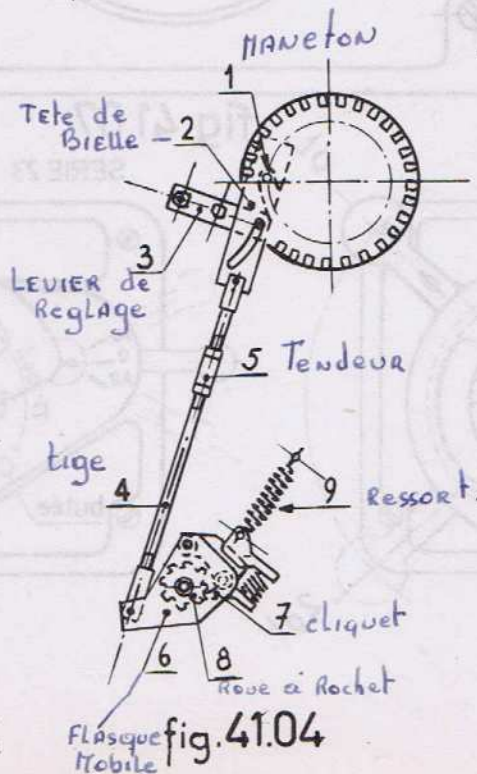


fig.41.04

Flasque Mobile

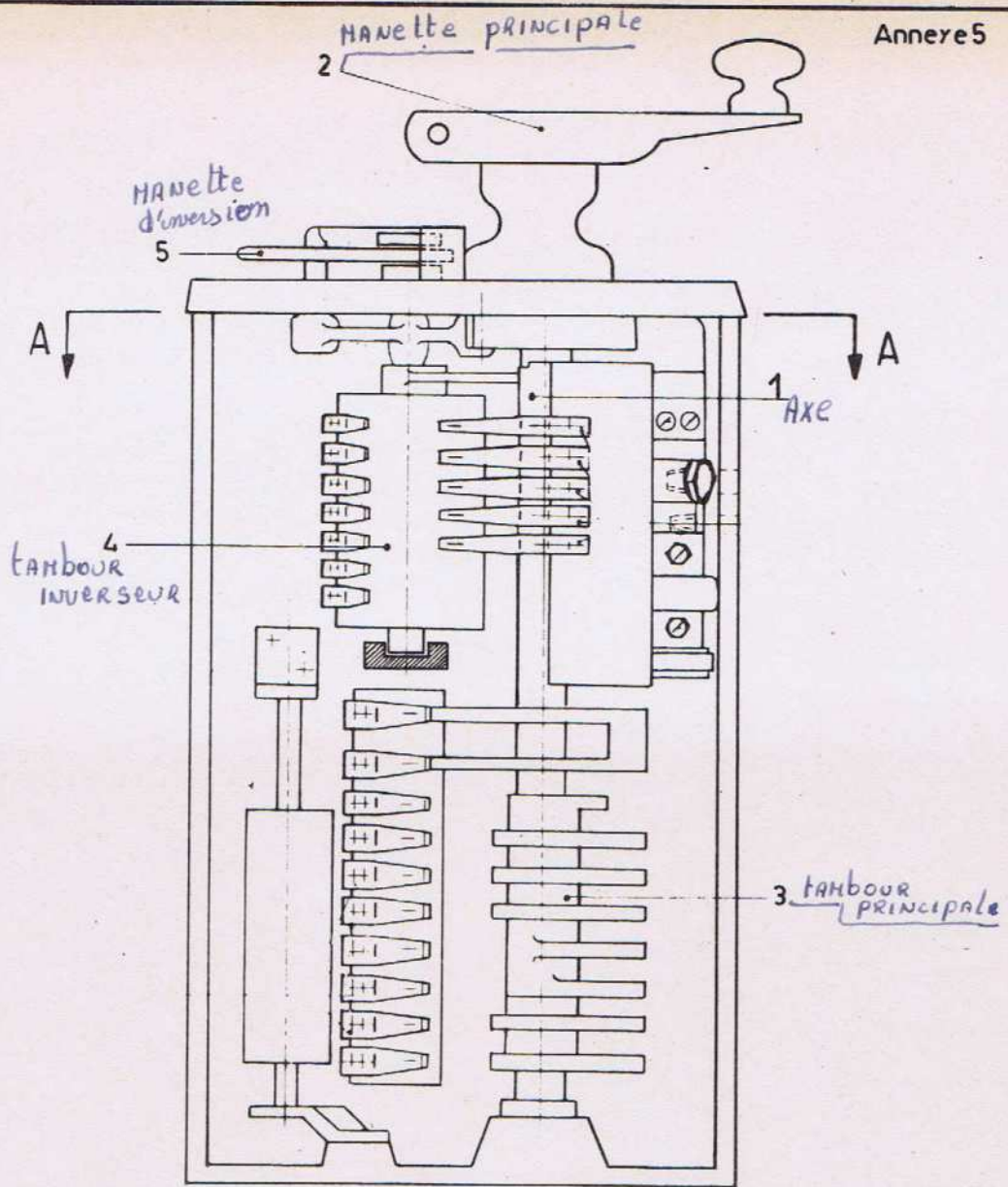
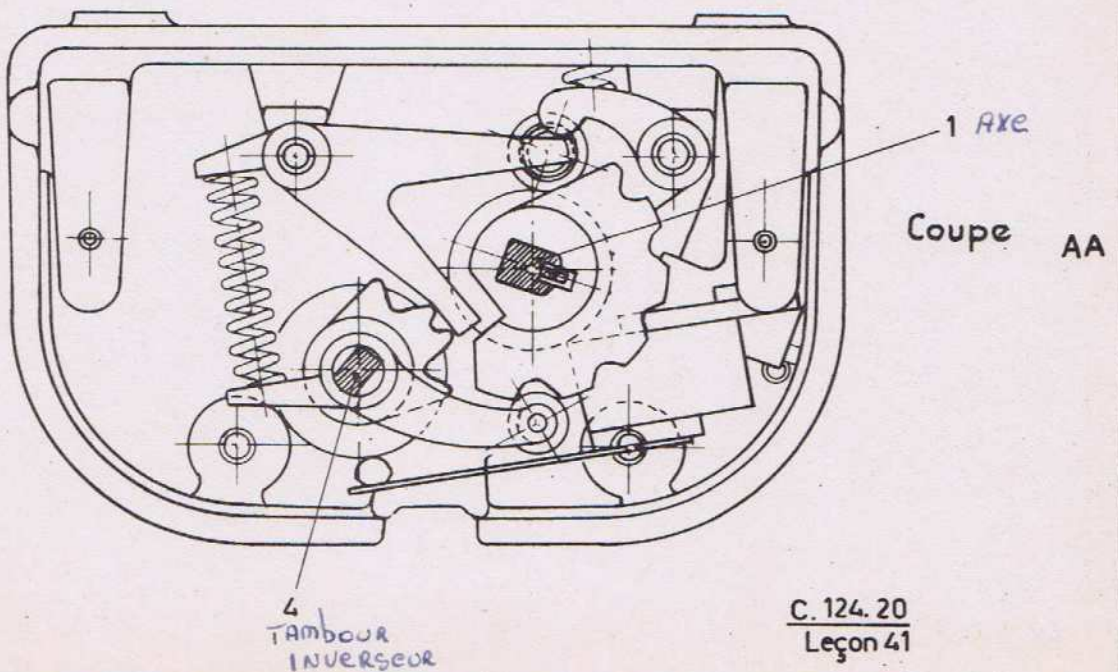


fig. 41.06



INVERSEUR DE MARCHÉ A COMMANDE PAR MOTEUR ELECTRIQUE

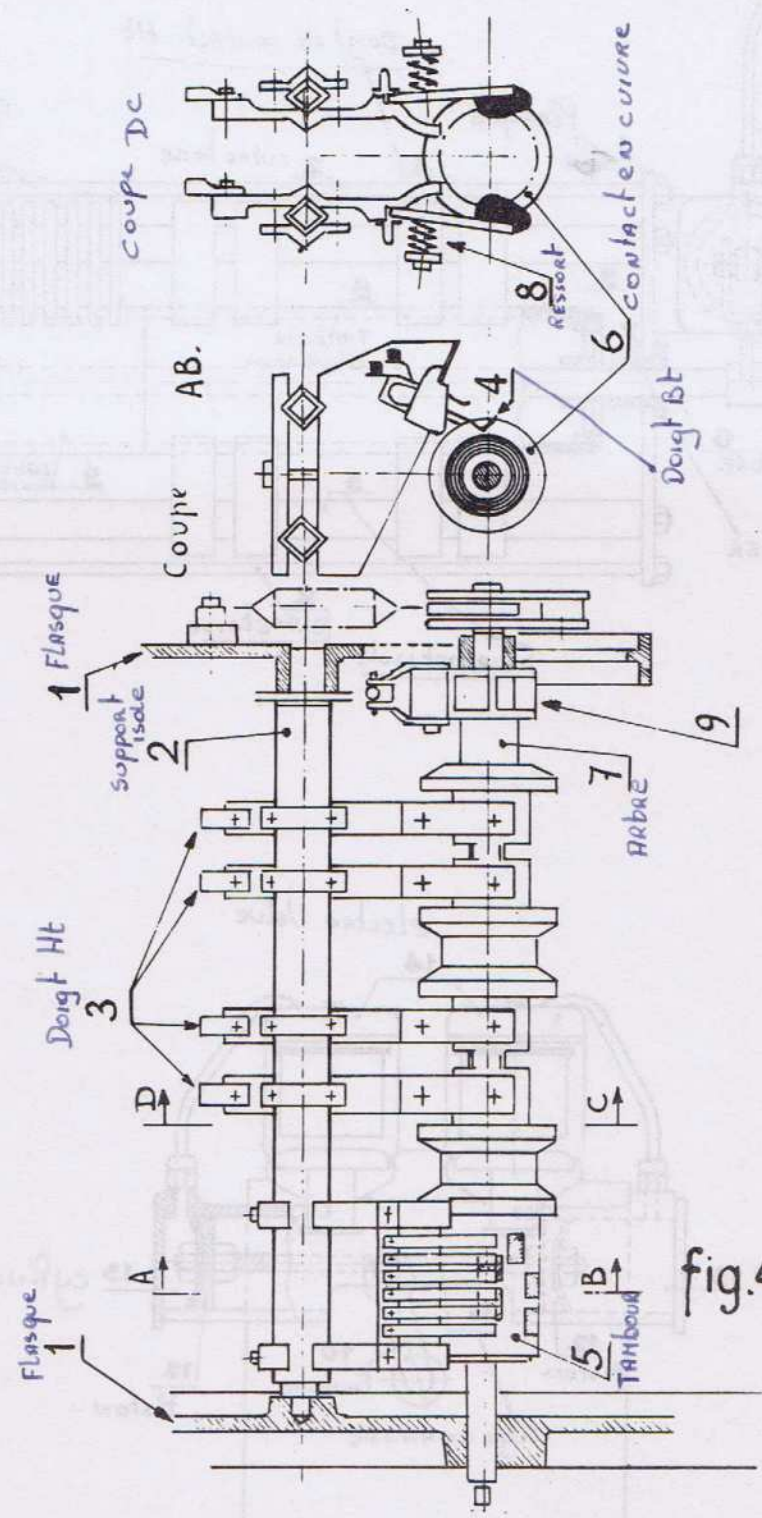


fig.41.02

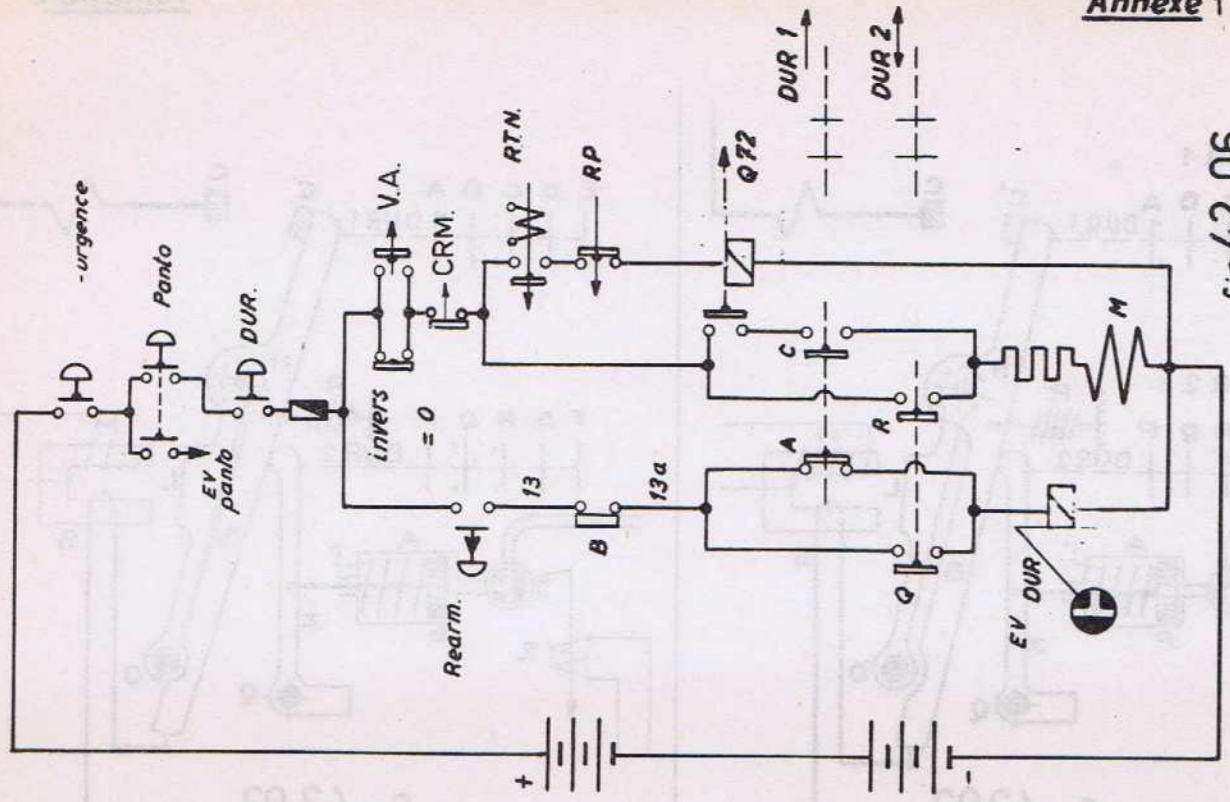


fig.42.06

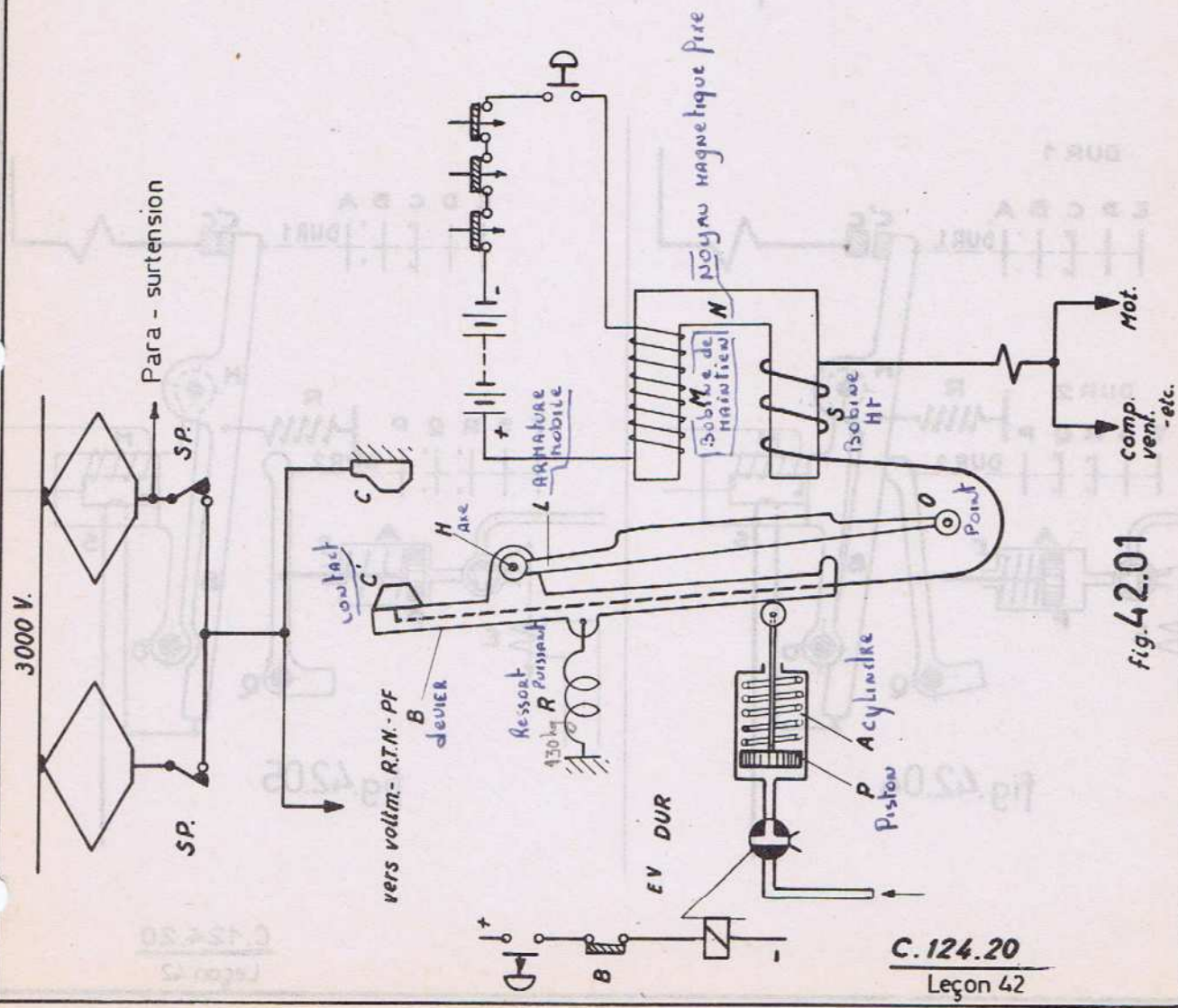


fig.42.01

C.124.20
Leçon 42

Poussoir pour reprise rapide

Poussoir pour passer au-delà de la position série

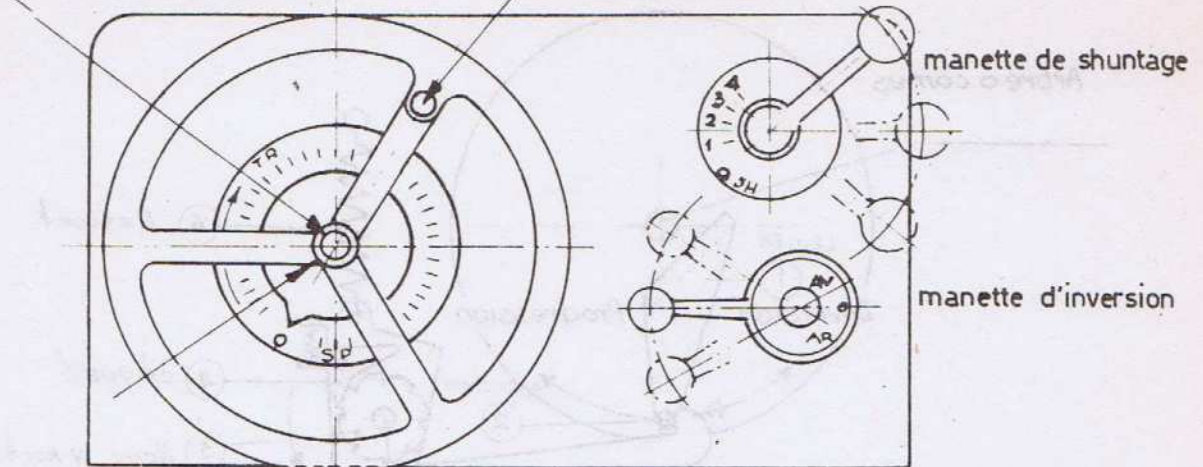


fig. 41.05

SERIE 26

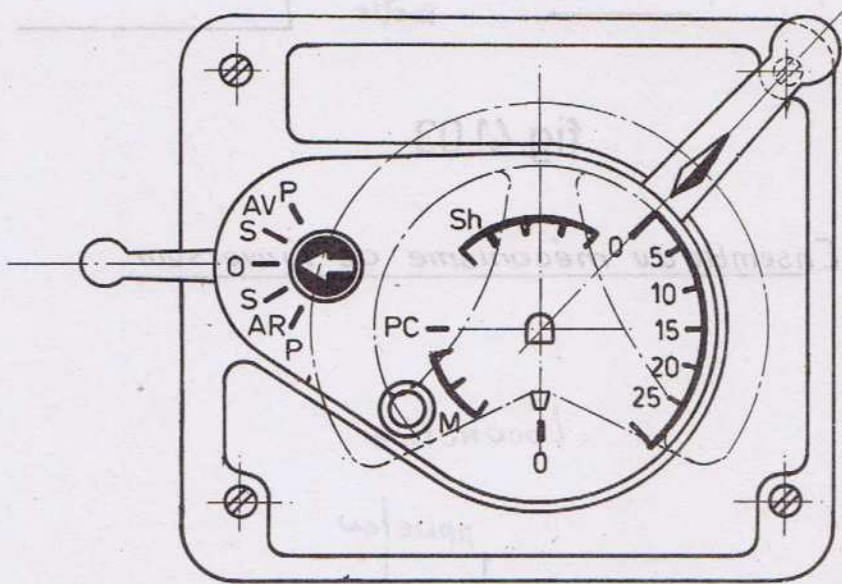
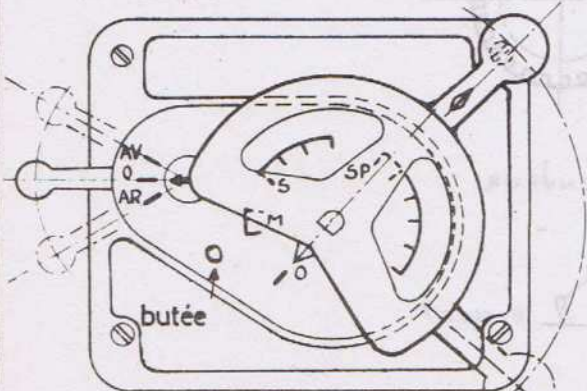


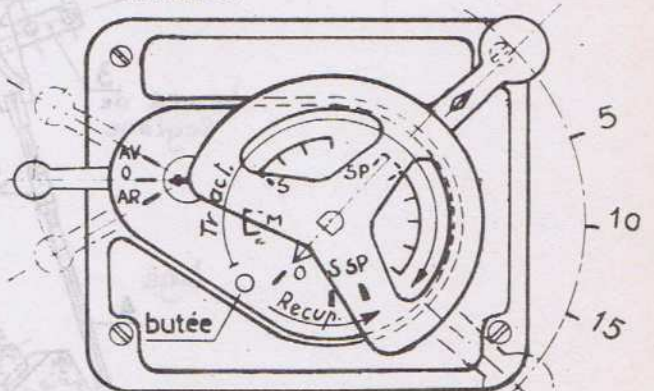
fig. 41.07

SERIE 22



20t.

SERIE 23



20t.

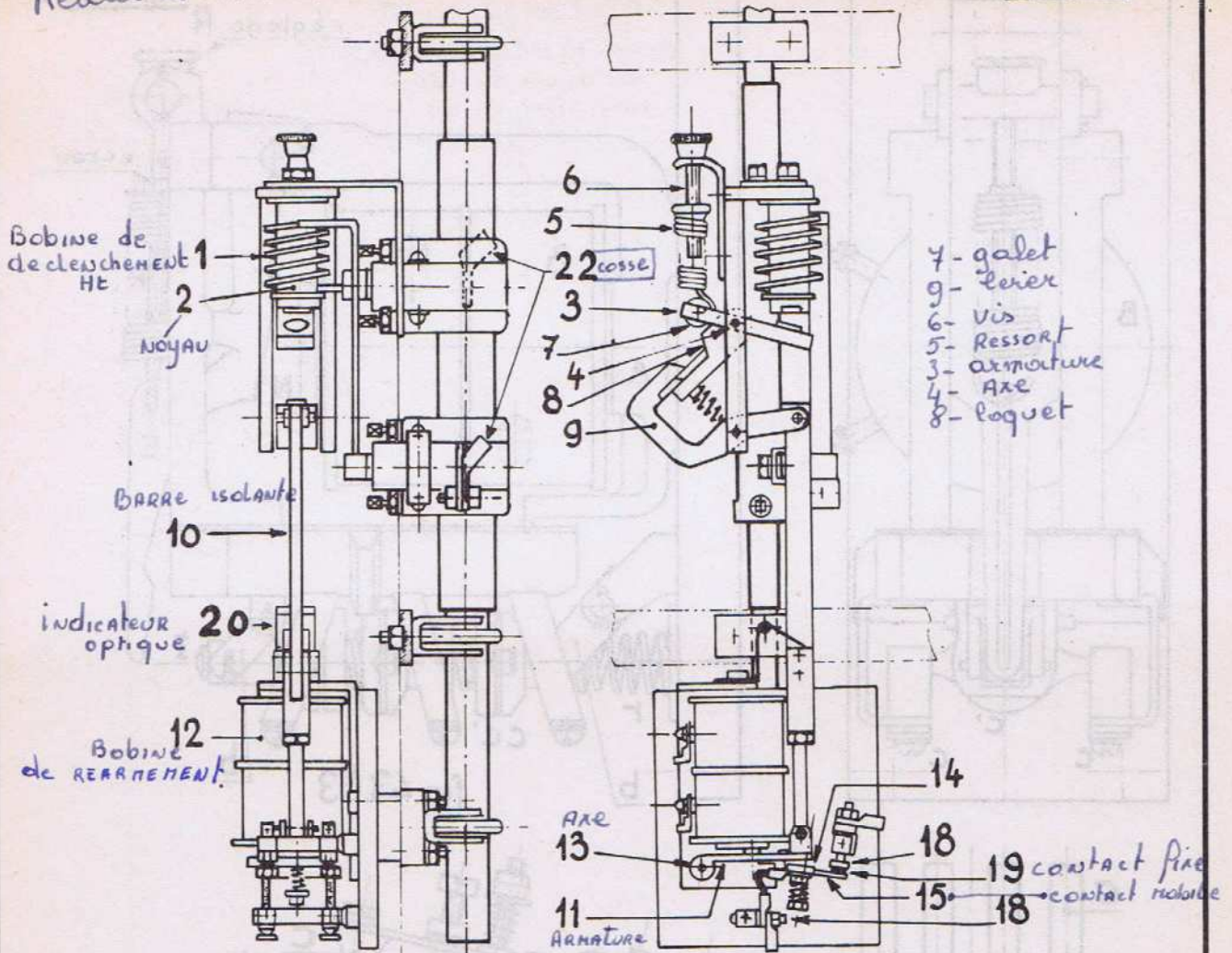


fig.43.01

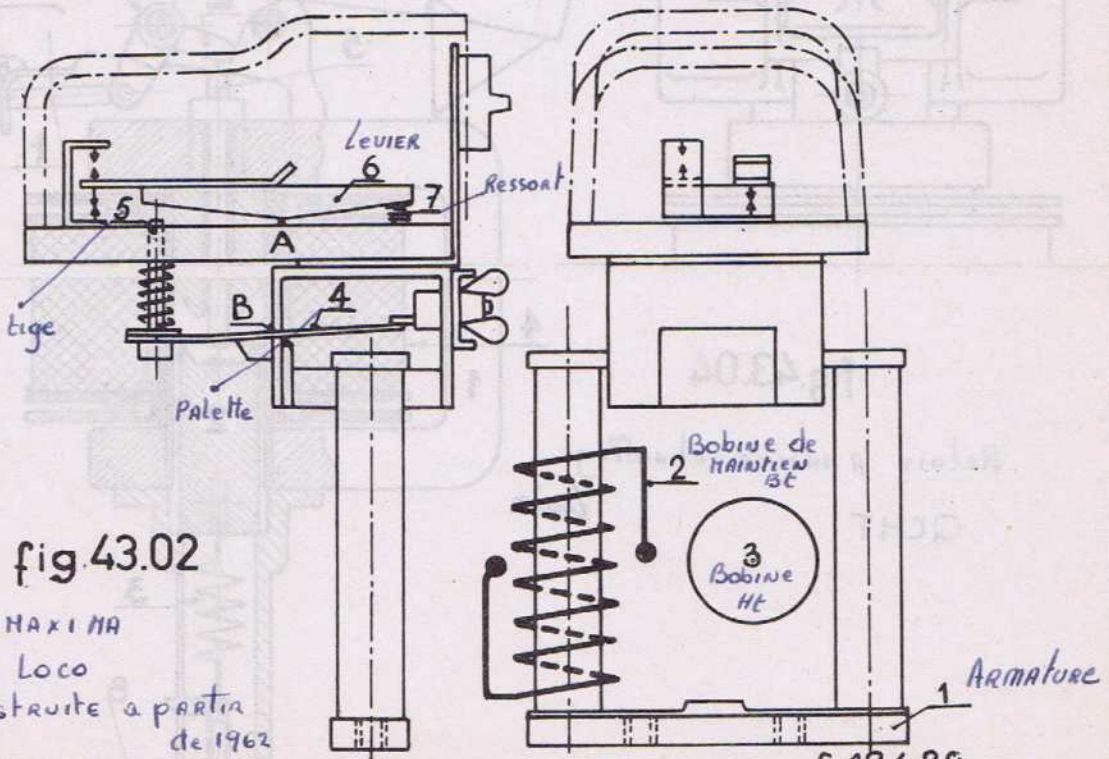


fig 43.02

Relais a MAXIMA
AM et Loco
construite a partir
de 1962

C.124.20

Leçon 43

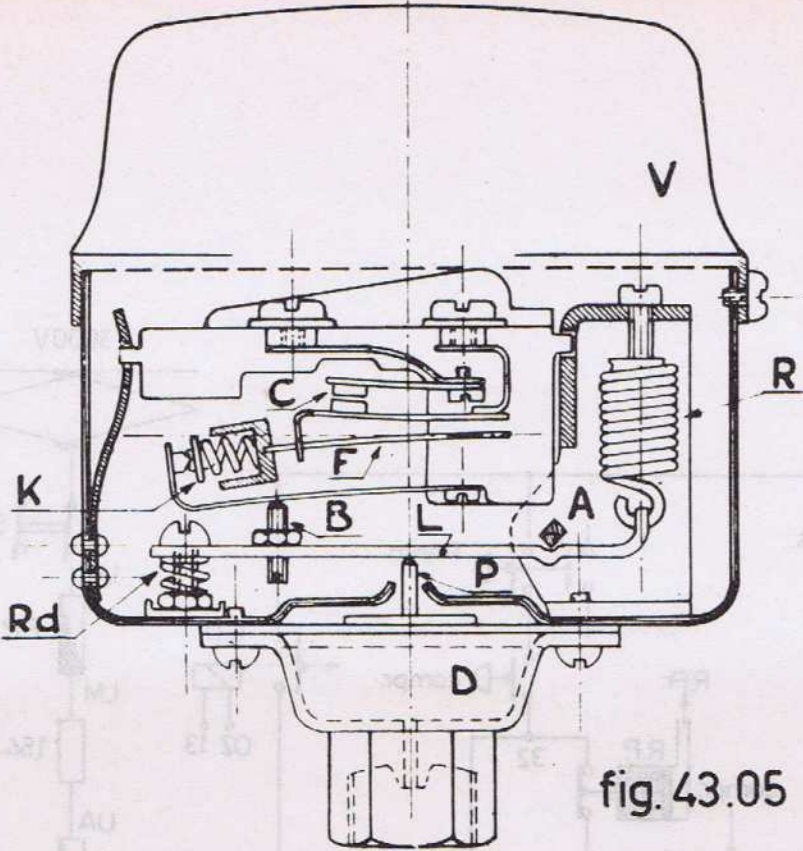


fig. 43.05

Relais d'acceleration type JHC des AM et loco equpees d'un systeme de demarrage du type JH.

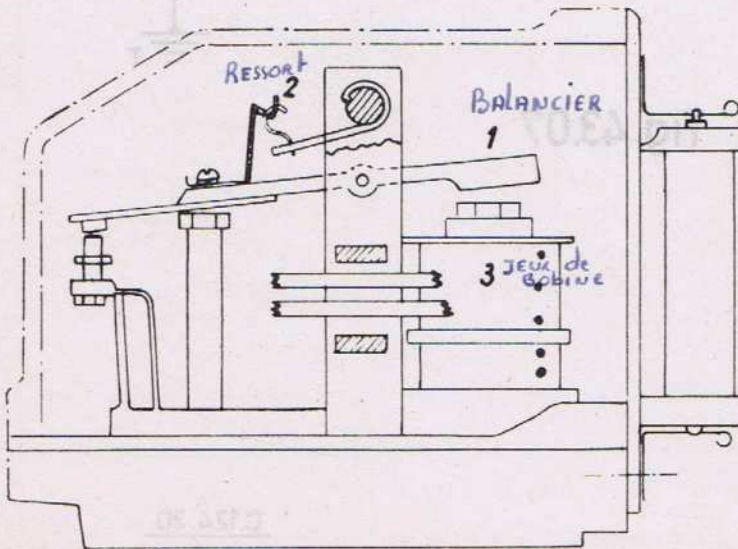


fig. 43.06

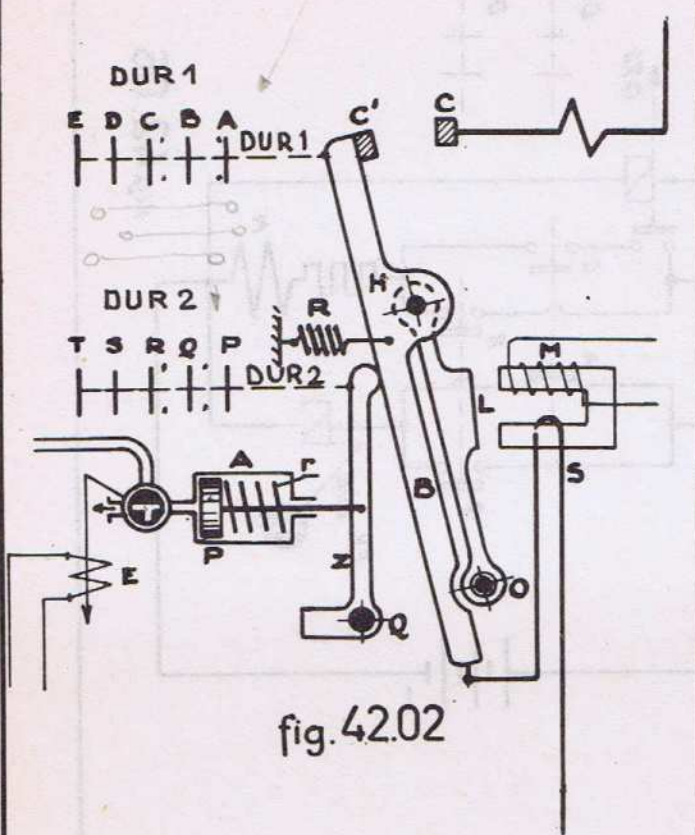


fig.42.02

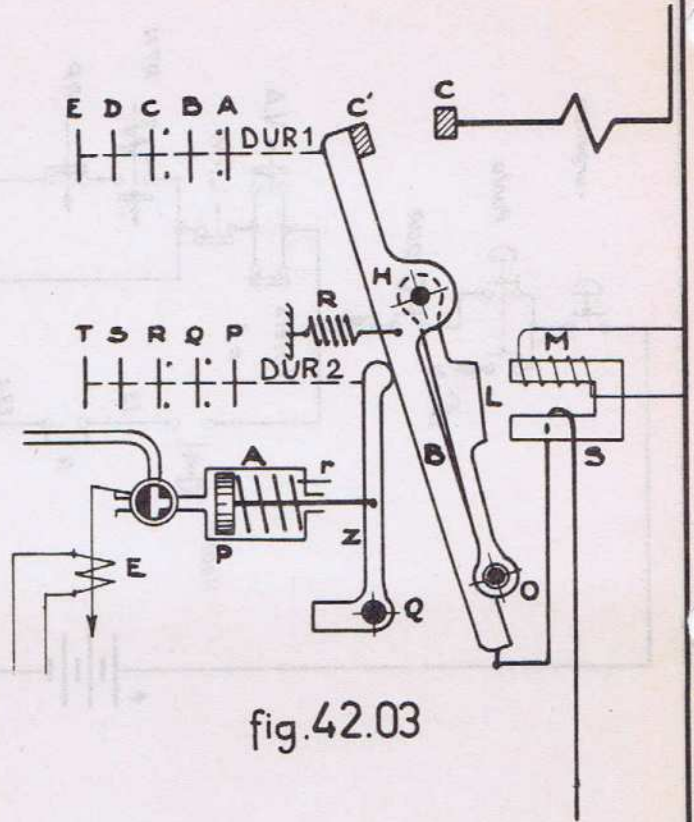


fig.42.03

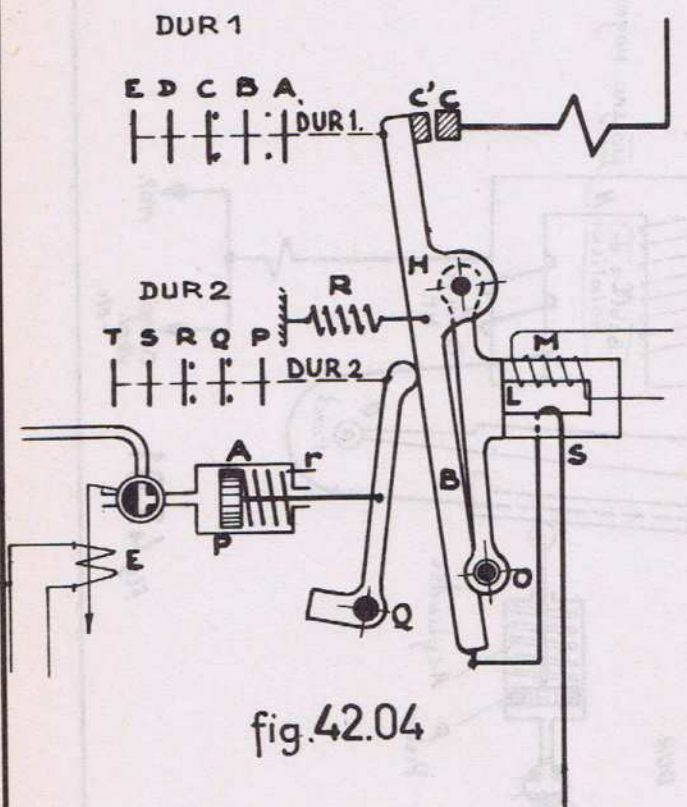


fig.42.04

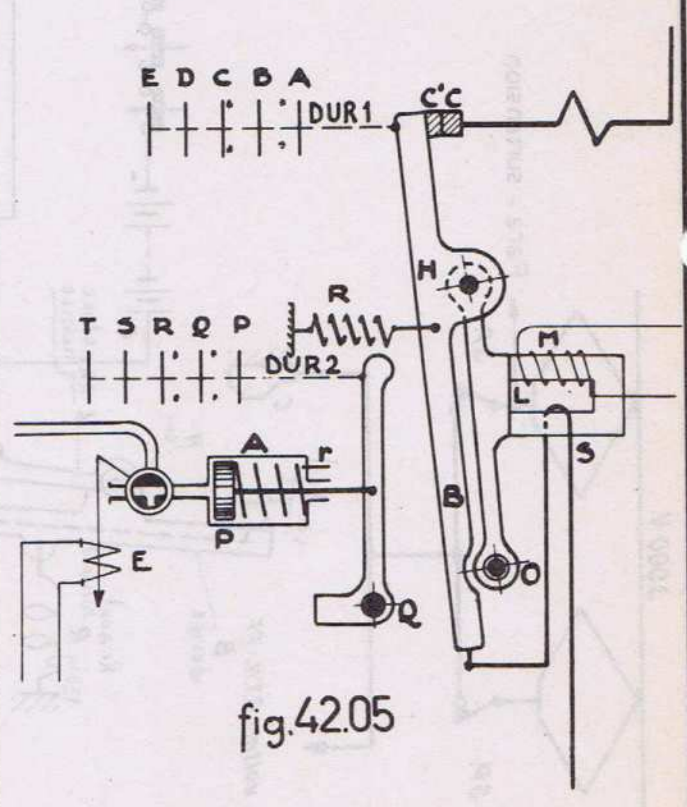


fig.42.05

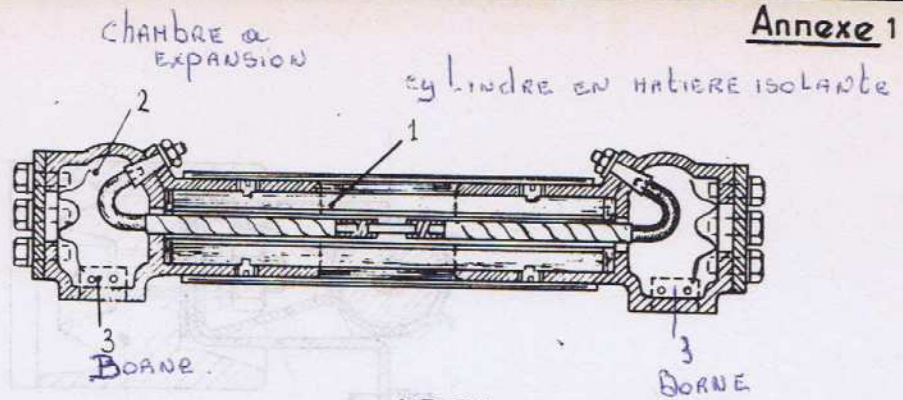


fig. 45.01

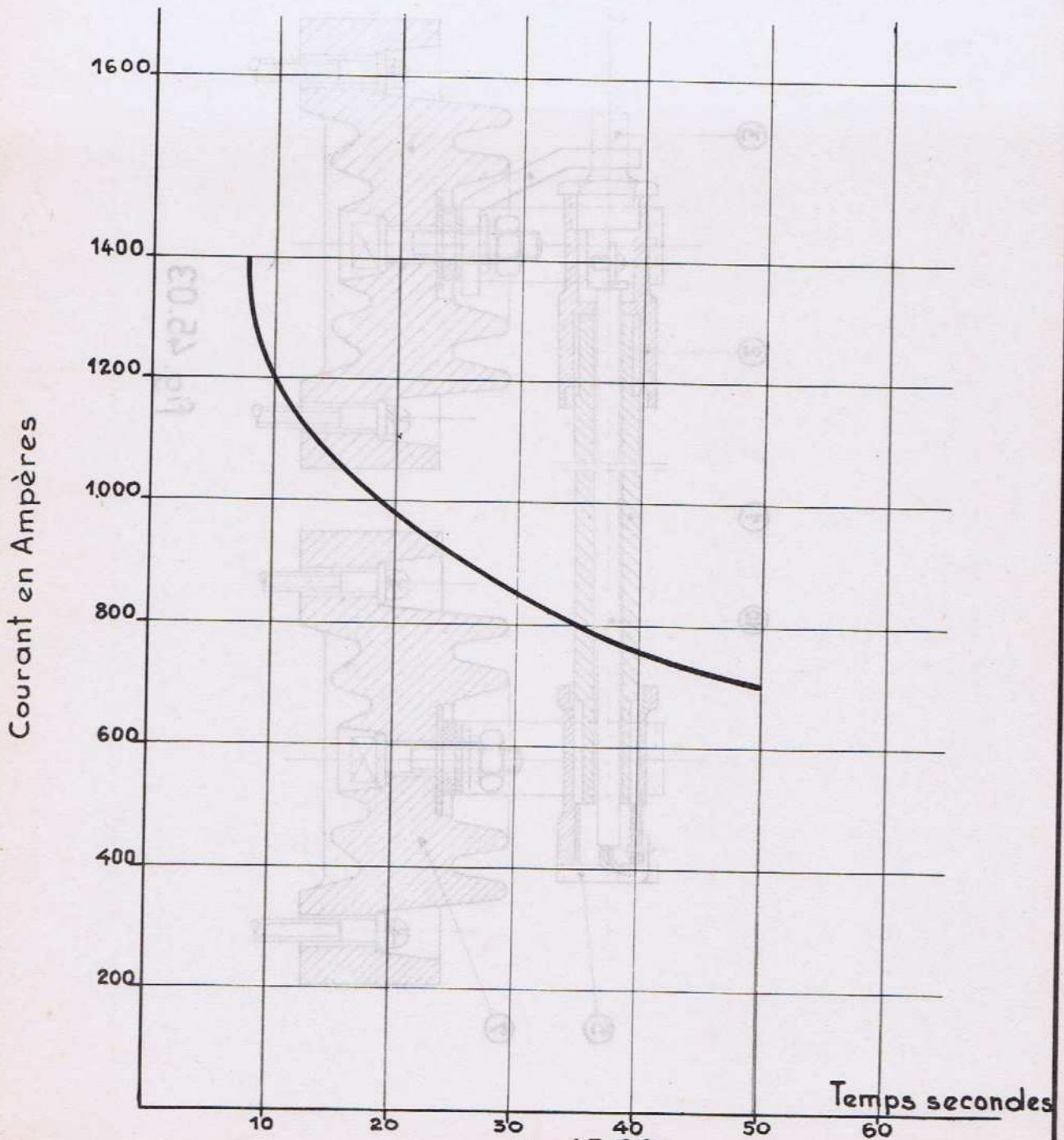


fig. 45.02

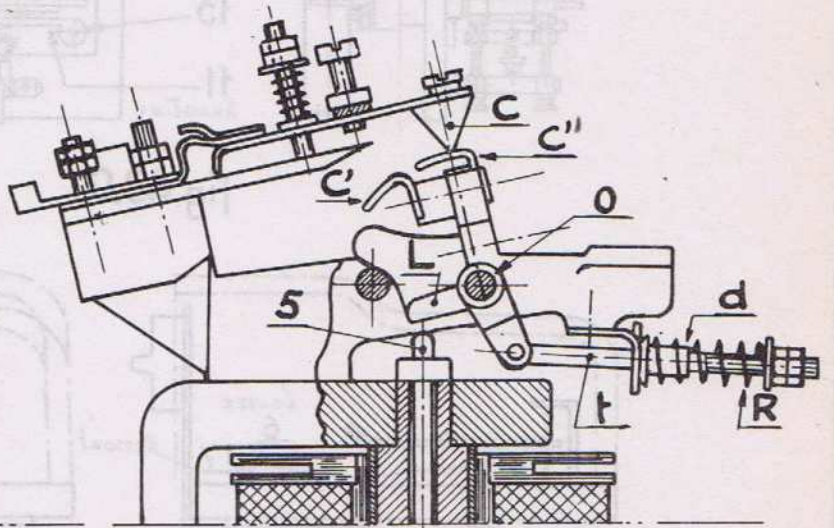
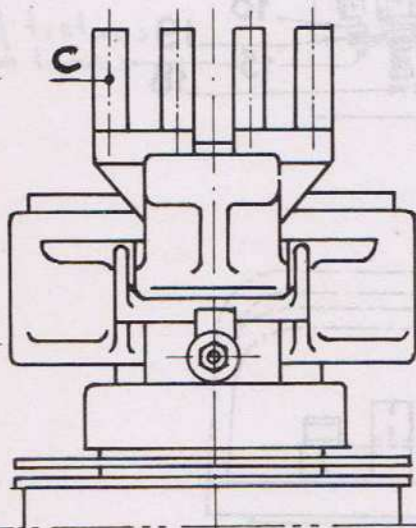
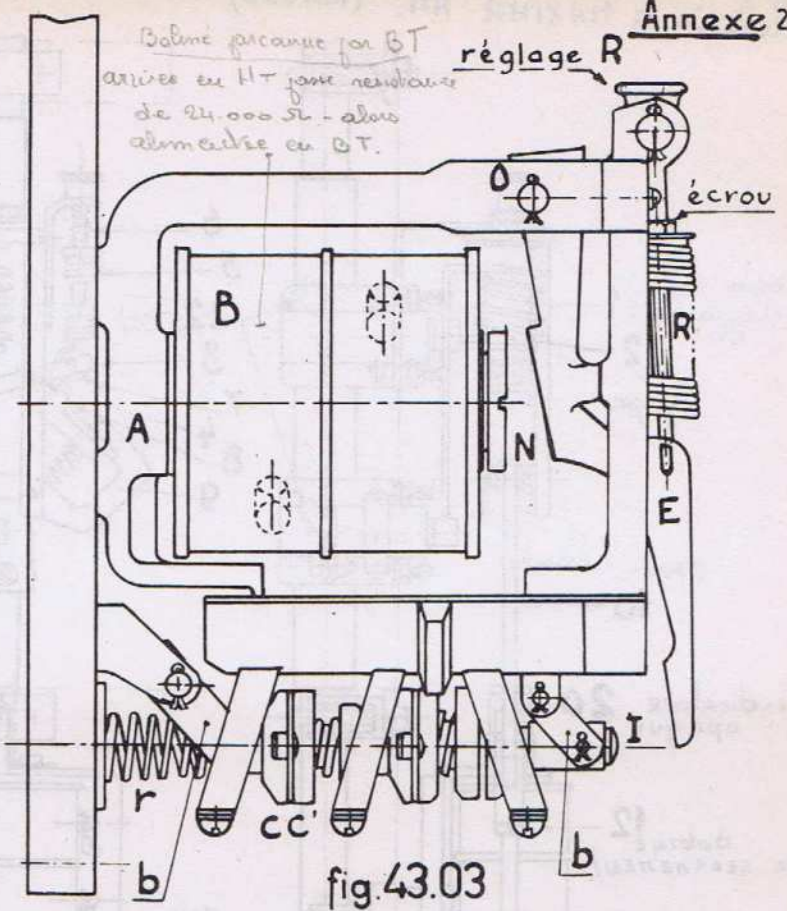
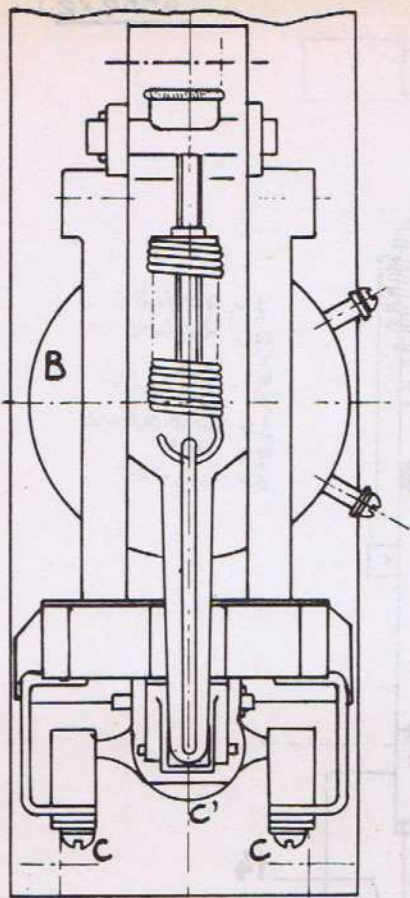
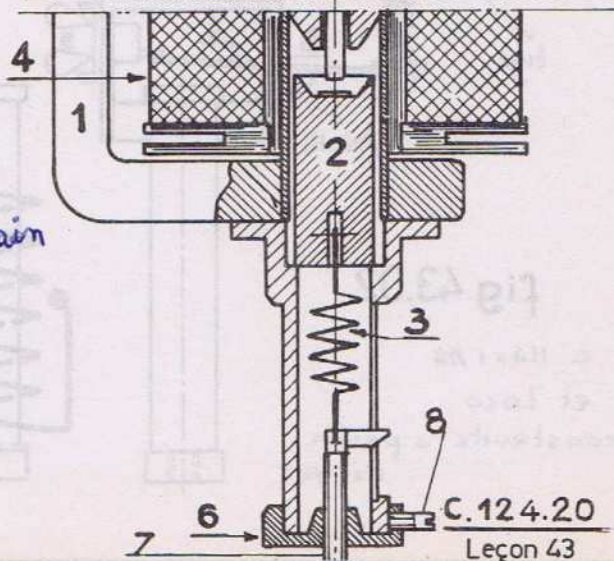
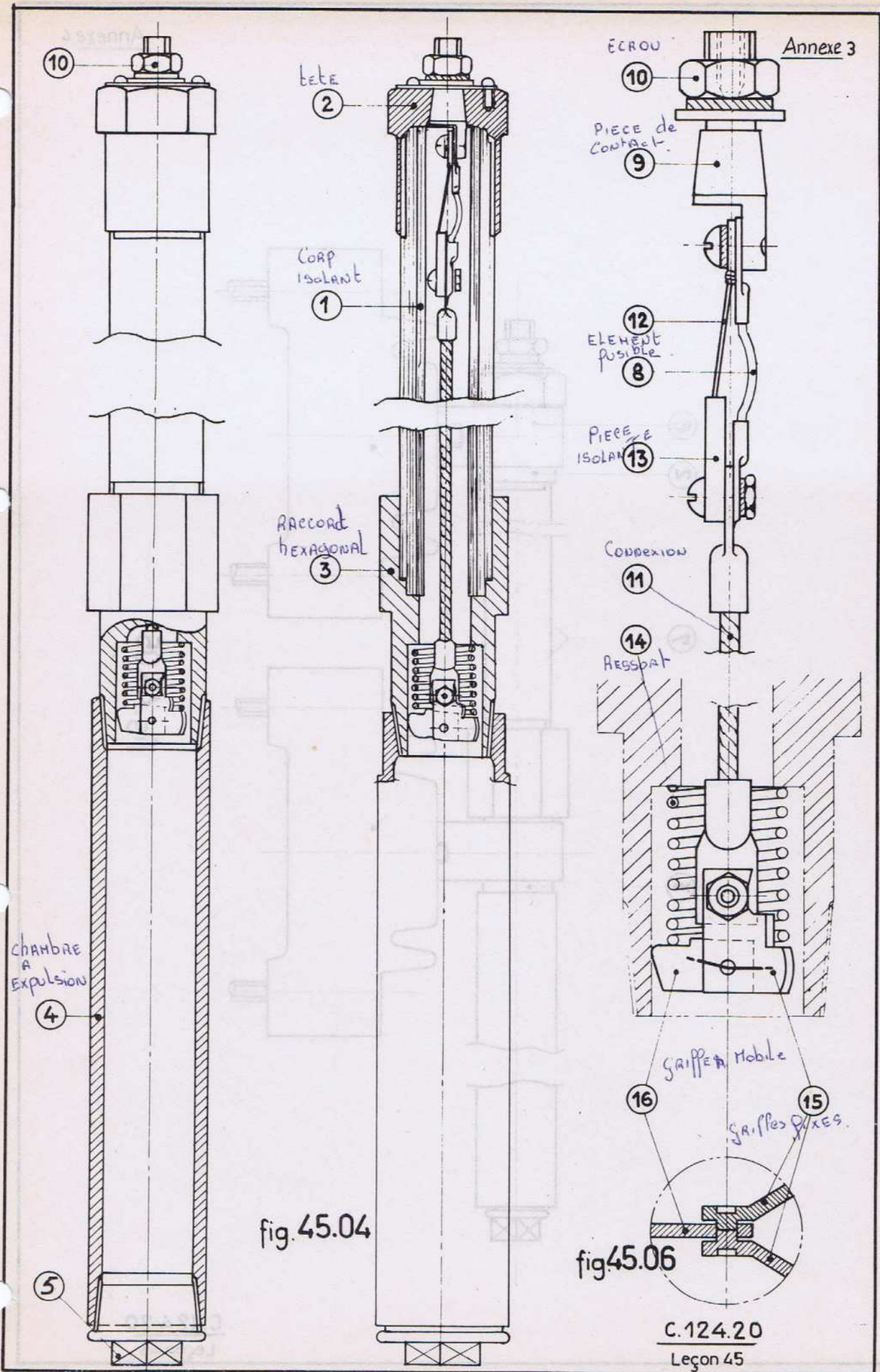


fig.43.04

Relais ANAXIMA chauffage train
QCHT





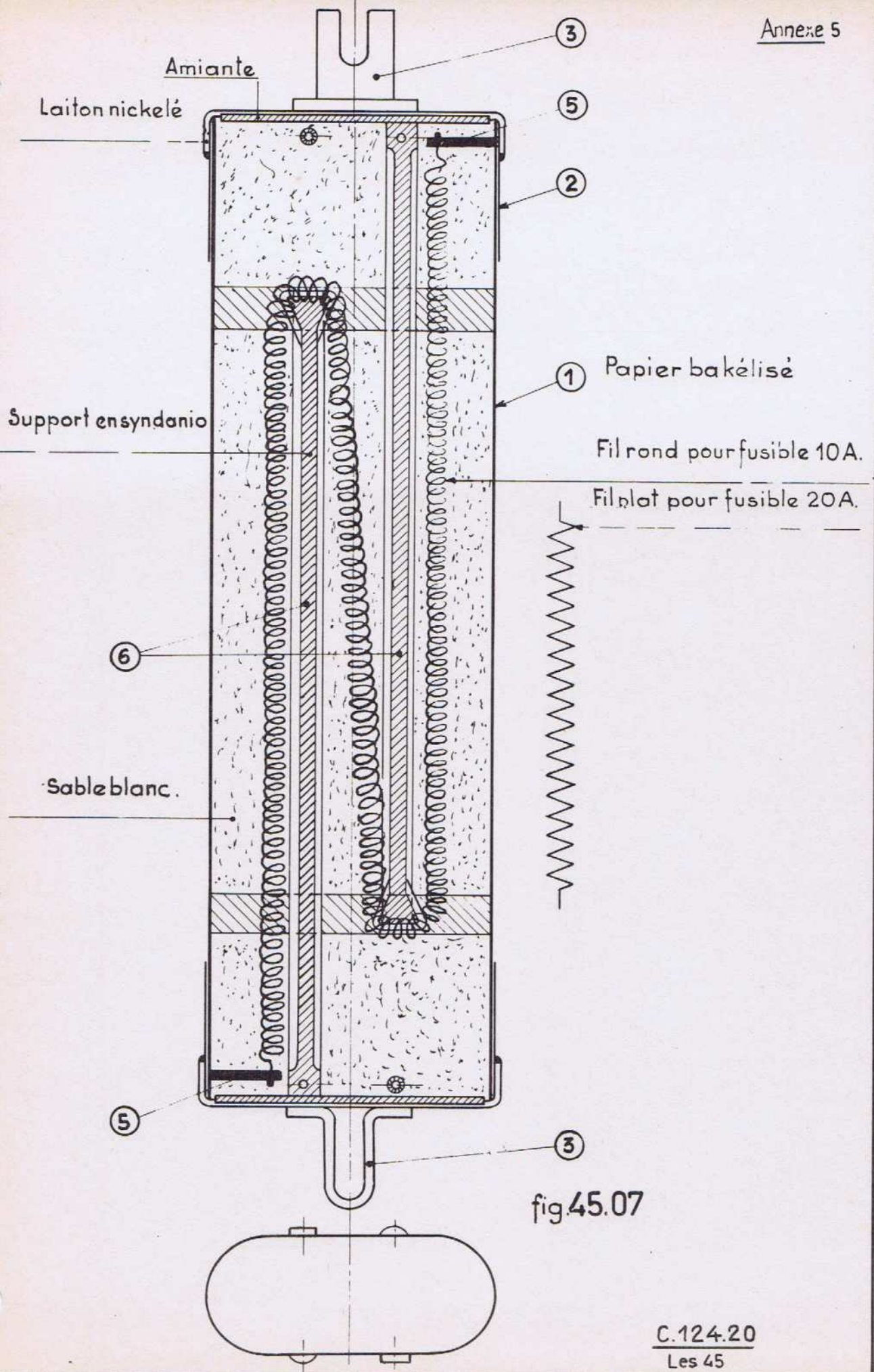


fig.45.07

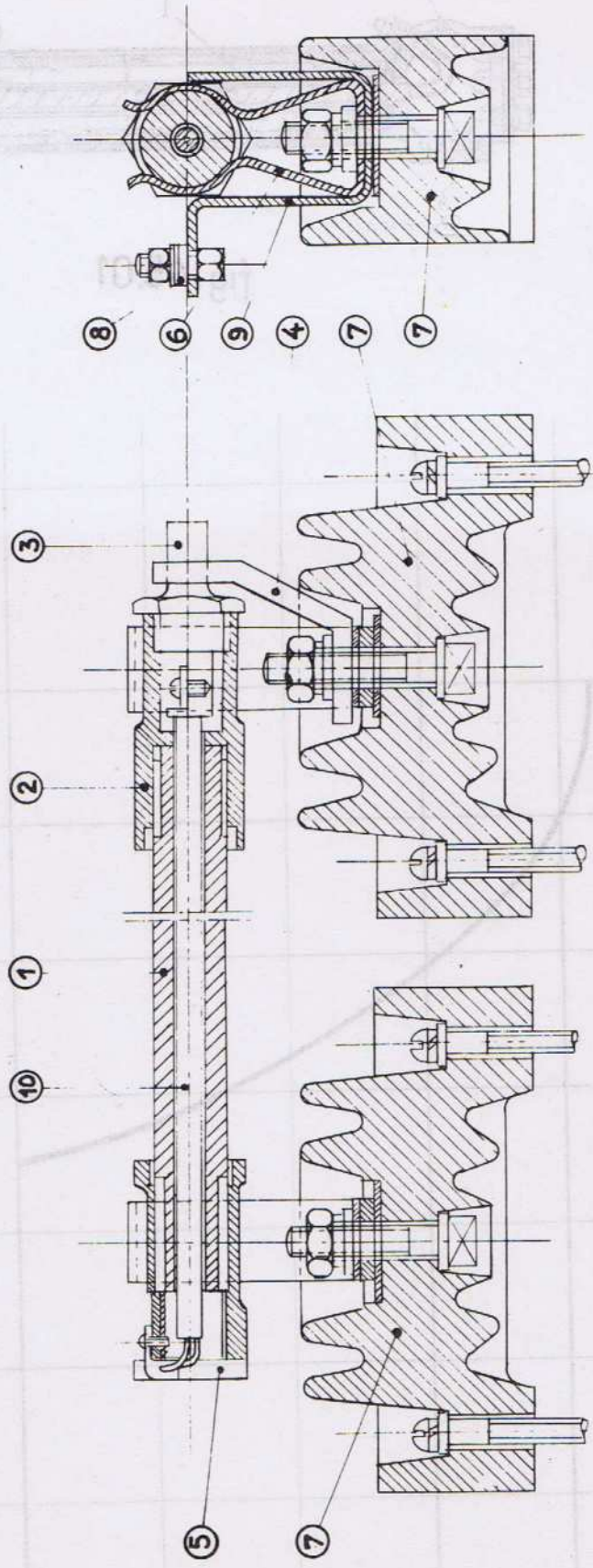


fig. 45.03

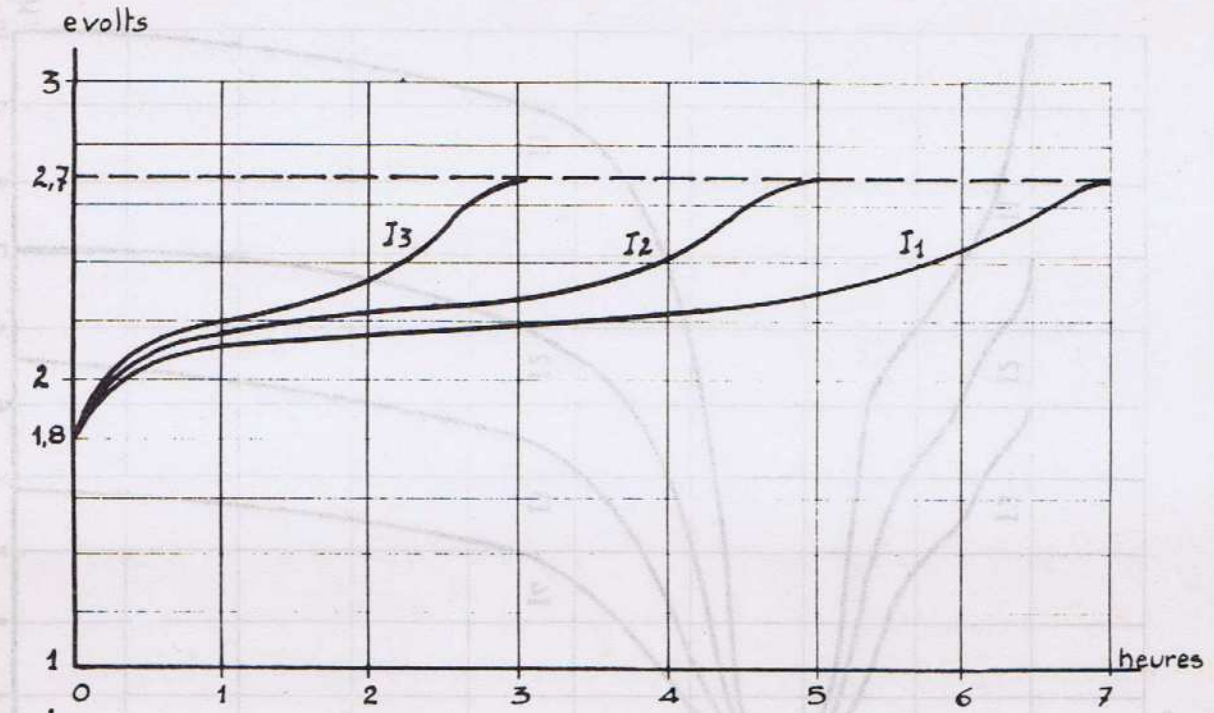


fig. 46.01

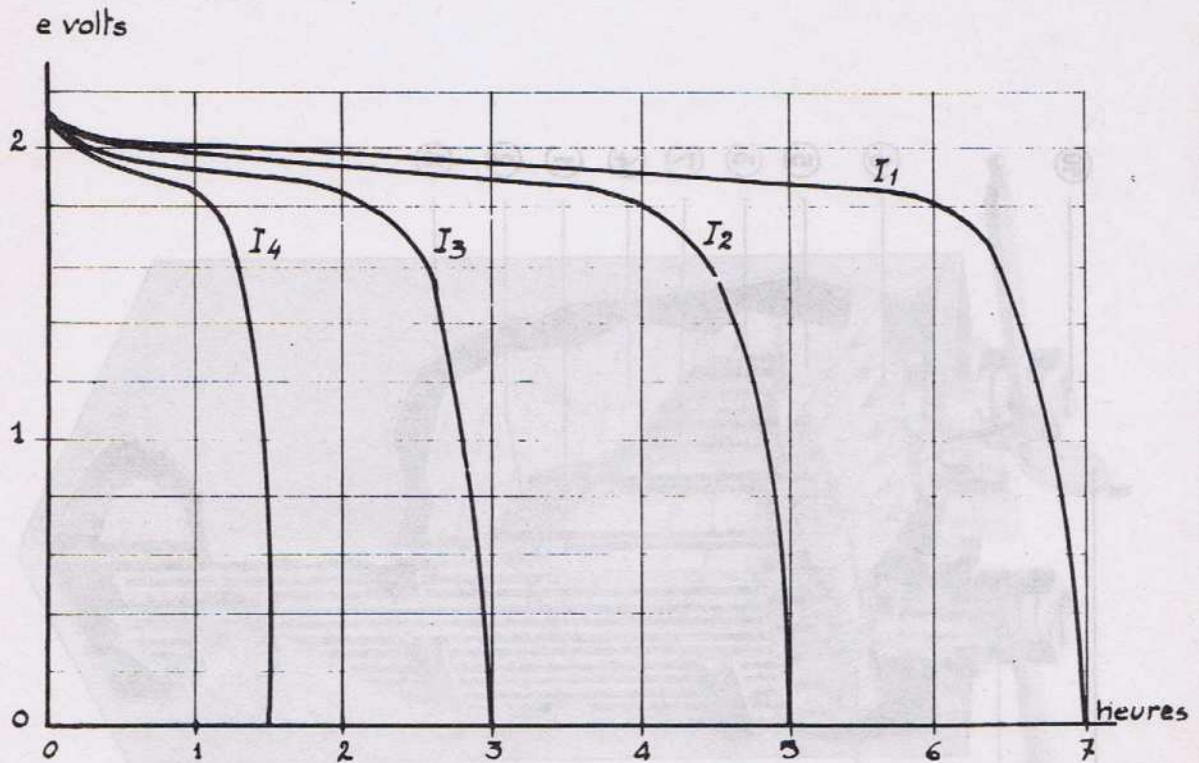


Fig. 46.02

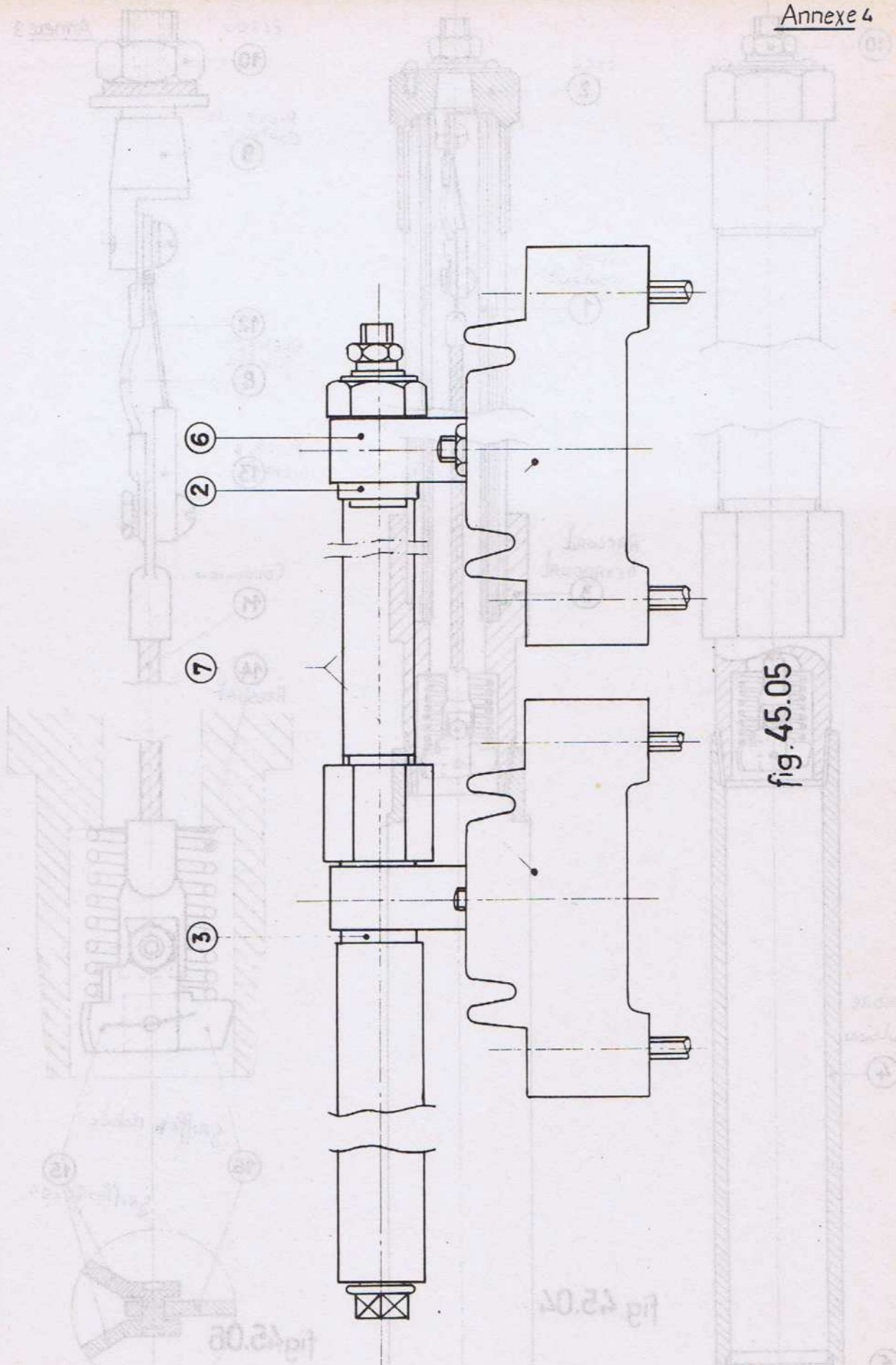


fig. 45.05

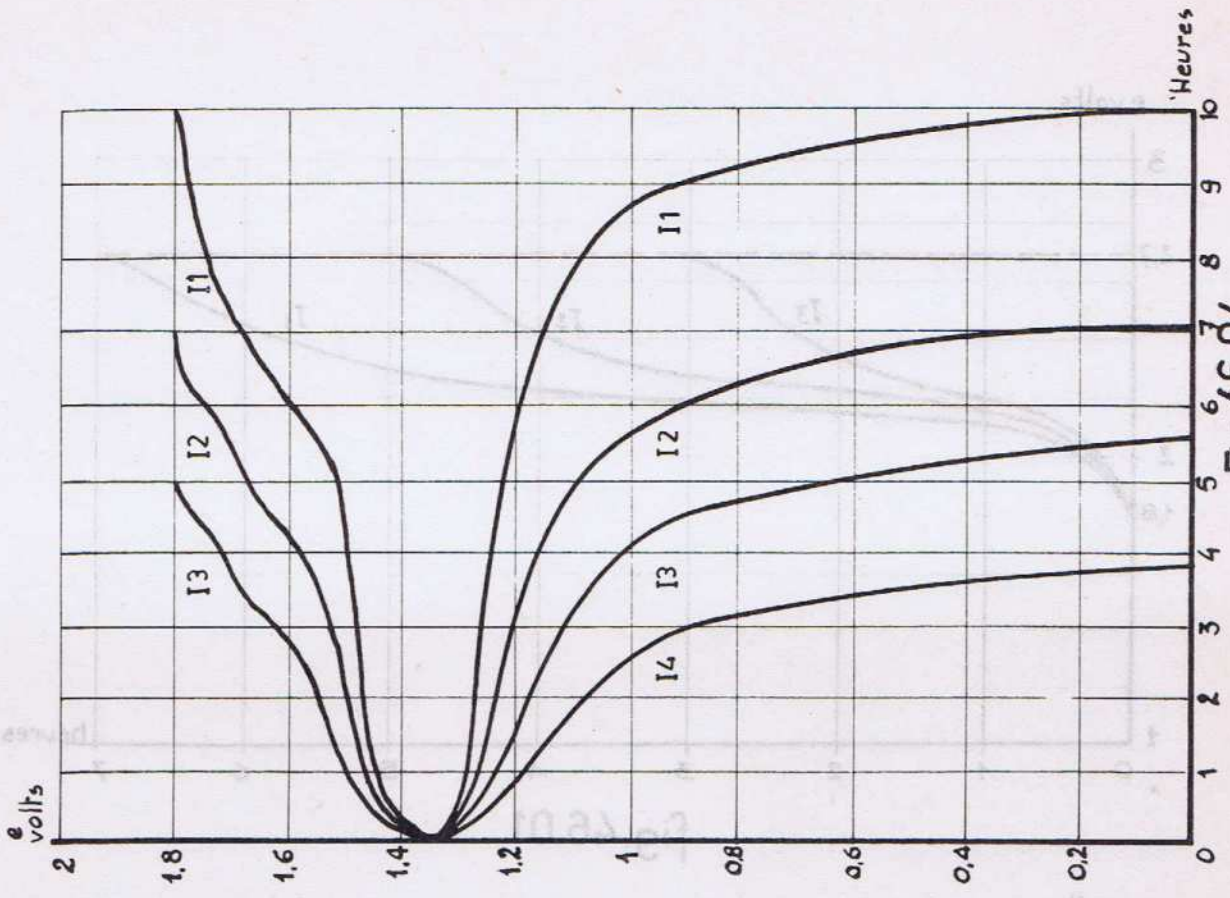


Fig.46.04

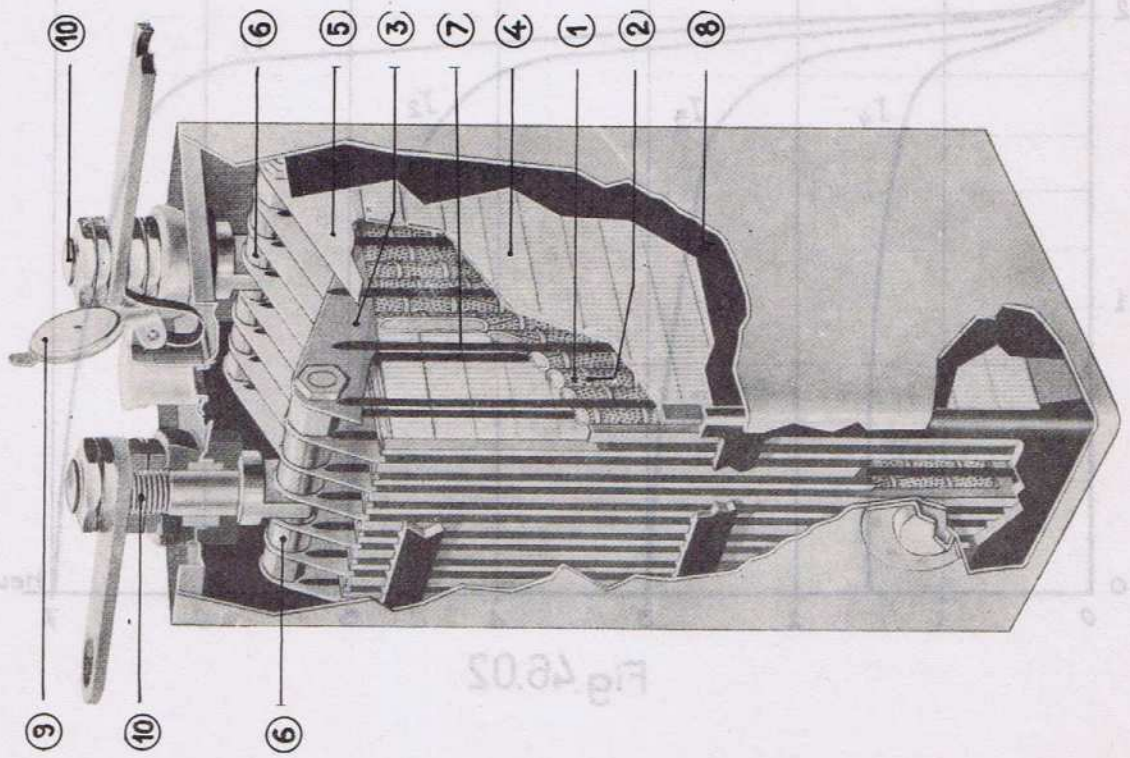


fig. 46.03

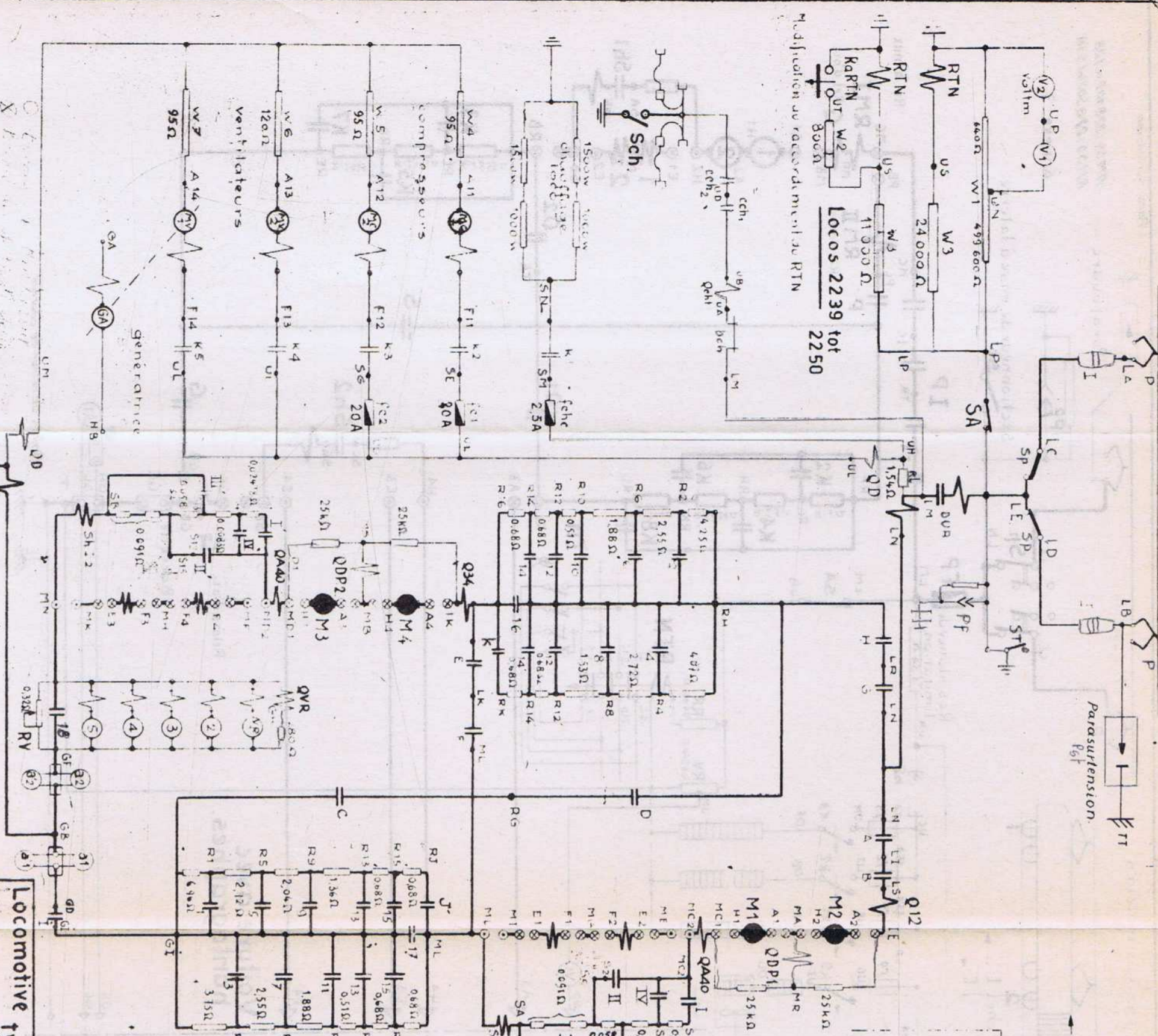
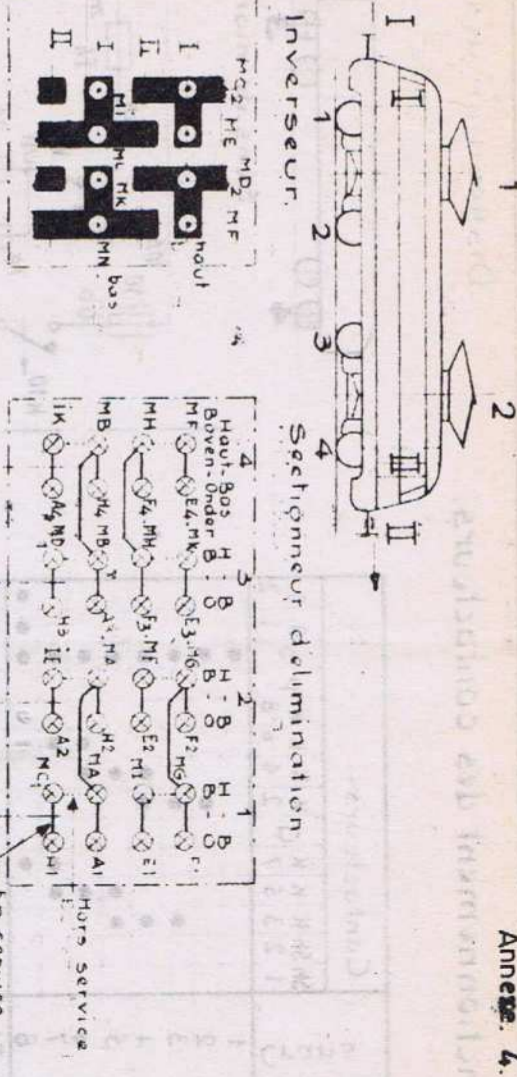


Fig. 22.04.



Contact	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
AC																								
CE																								
EG																								
J																								
K																								
L																								
M																								
N																								
O																								

Contact	1	2	3	4	5	6	7	8	9	10	11	12	13	14
I														
II														
III														
IV														
V														
VI														
VII														
VIII														
IX														
X														
XI														
XII														
XIII														
XIV														

Locomotive type 22.

Circuits de puissance et auxiliaires à 3 000 V.

22/A.00.01.01.

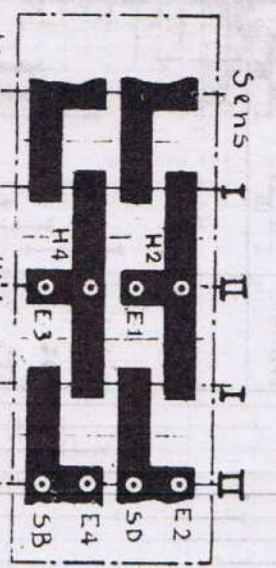
⊙ Bornes de l'inverseur.
⊗ Bornes des sections d'alimentation.

C. 224.20
225 L.

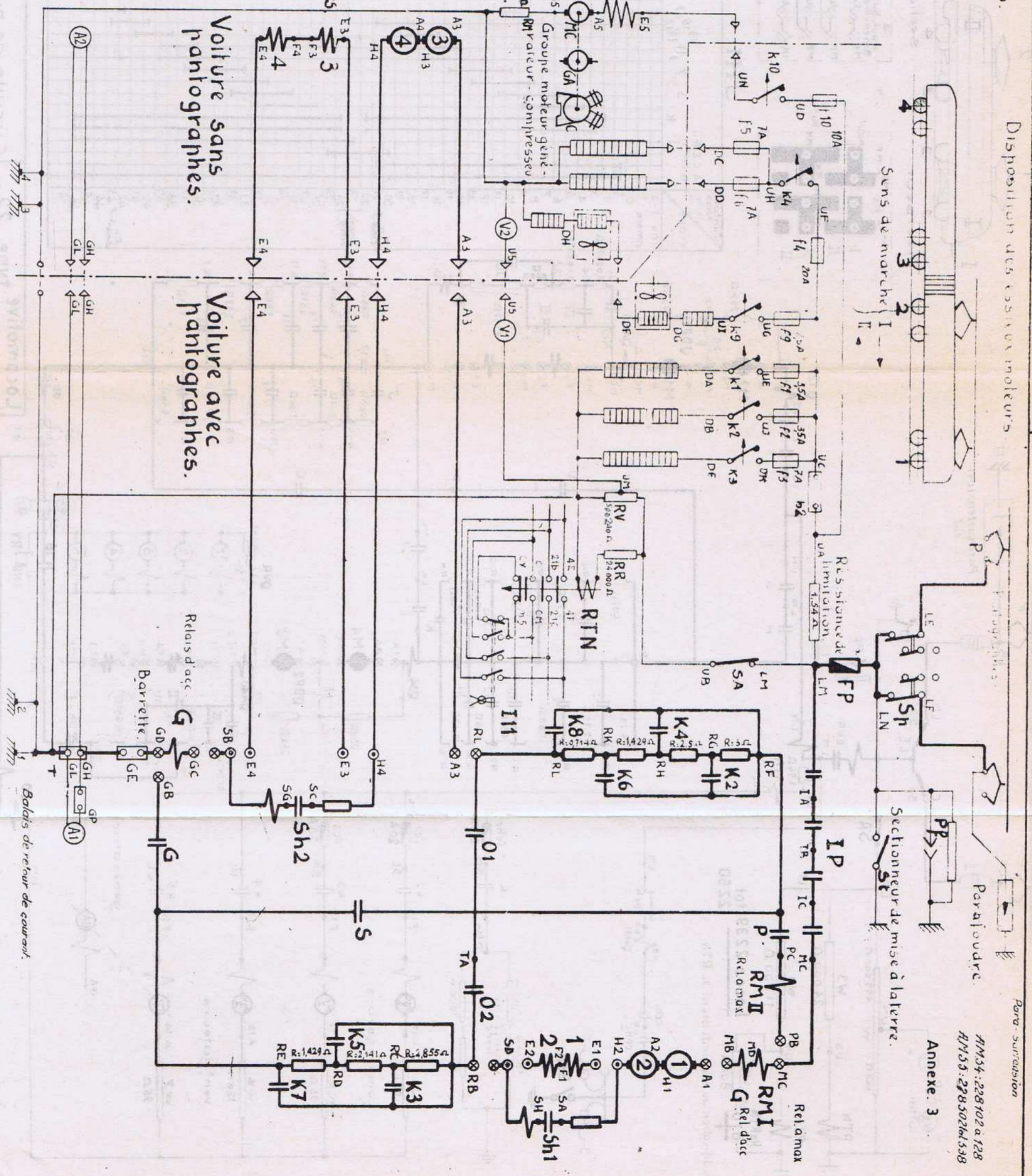
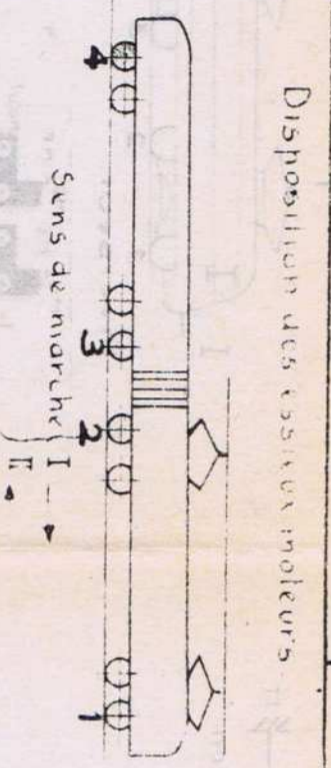
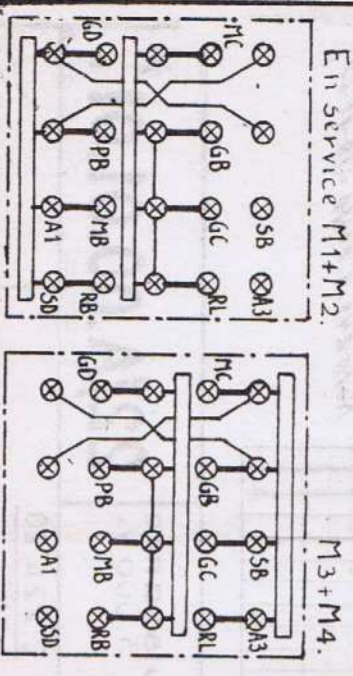
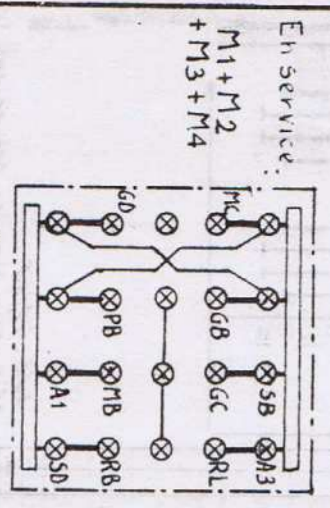
M.L. 4/1/68
N° 241.5.210/2 (19-11-68)

Crans	Contacteurs							
	Sh	K1	K2	K3	G	K4	K5	P
1								
2								
3								
4								
5								
6								
7								
8								
T1								
T2								
9								
10								
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								

Inverseur du sens de marche.



Sectionneur pour l'élimination des moteurs.



⊙ Bornes de l'inverseur.
⊗ Bornes des sectionneurs délimitation.

Fig. 22.03

Conduite autor

Filtre a Air
EN LAITON

2

3

Bouchon de
MAINTIEN du P.ltre

5

Soupage

9

Bouchon
d'echappement

ATM.

C
TROU
CALIBRE

VERS
Rever
temporisation

Piston EN
BRONZE

Corp en fonte

4

10

8

6

7

1

Couvercle

Ressort de
Rappel

fig.47.01

VALVE d'URGENCE

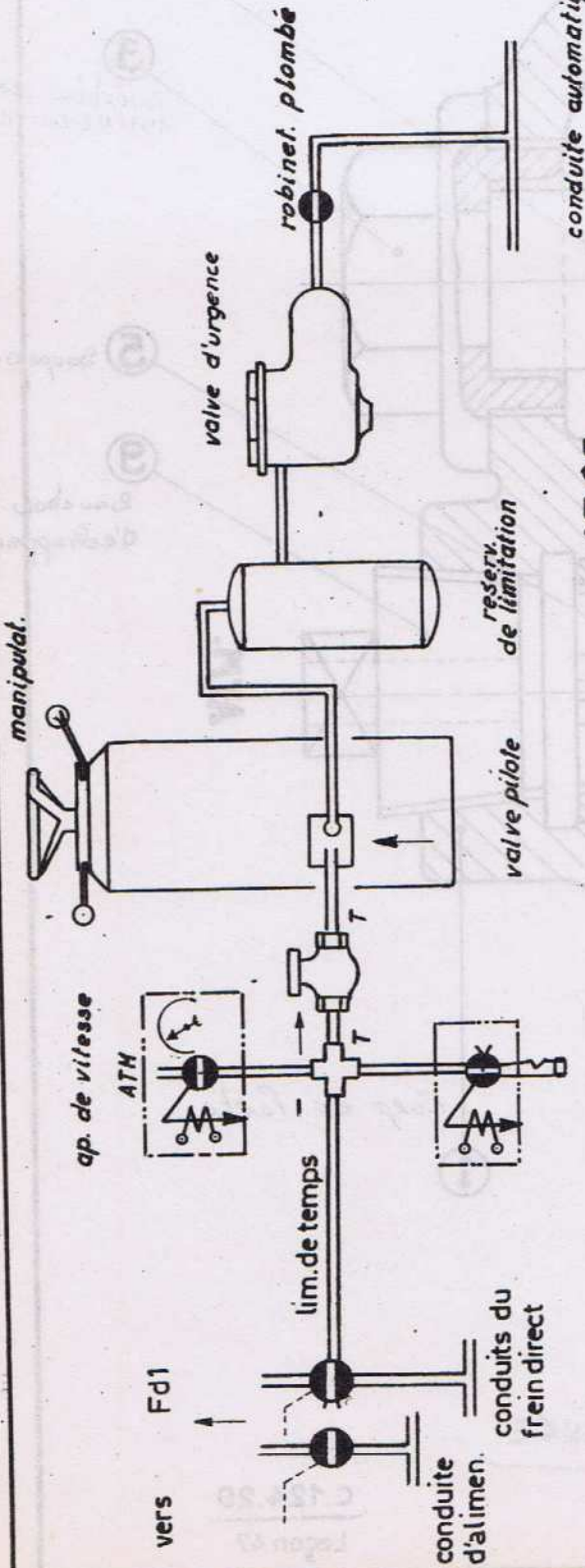


fig. 47.05

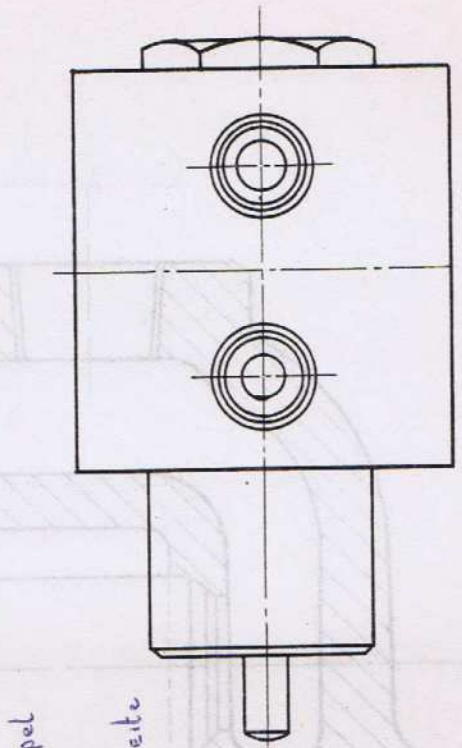
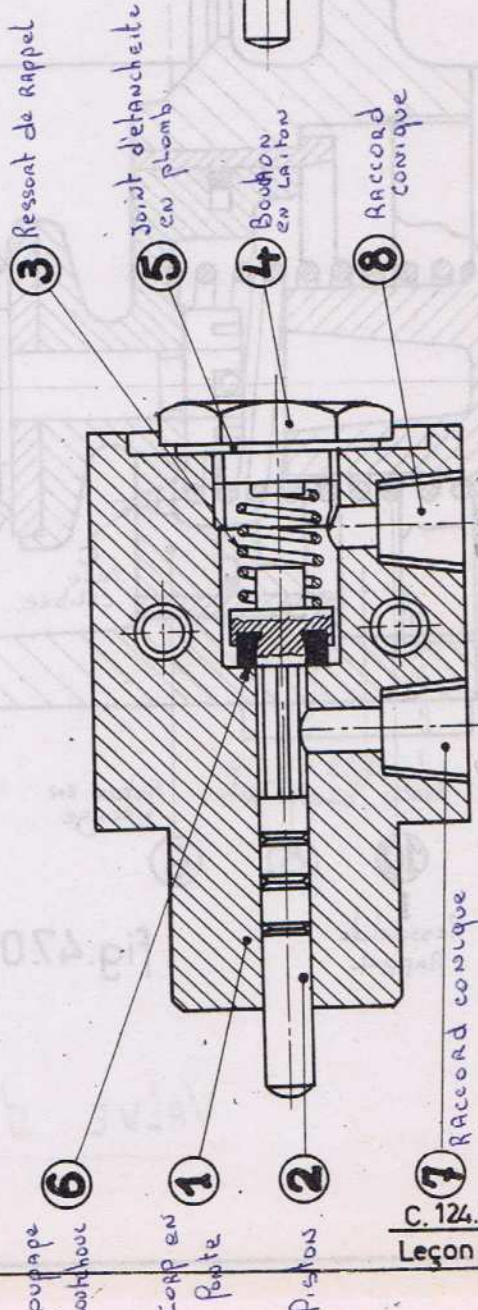


fig. 47.02



C. 124.20
Leçon 47

VALVE PILOTE

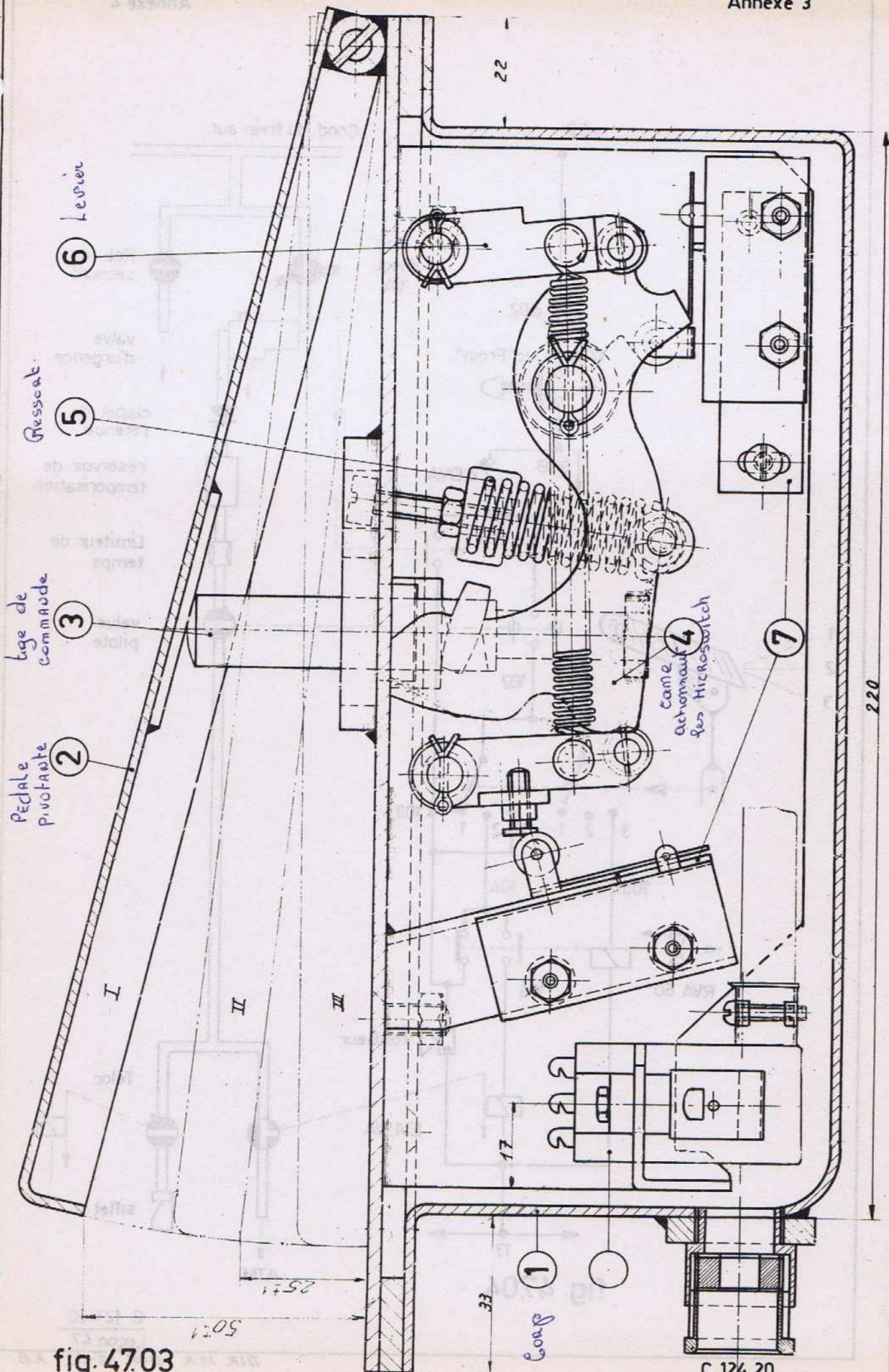


fig. 47.03

C.124.20

Leçon 47

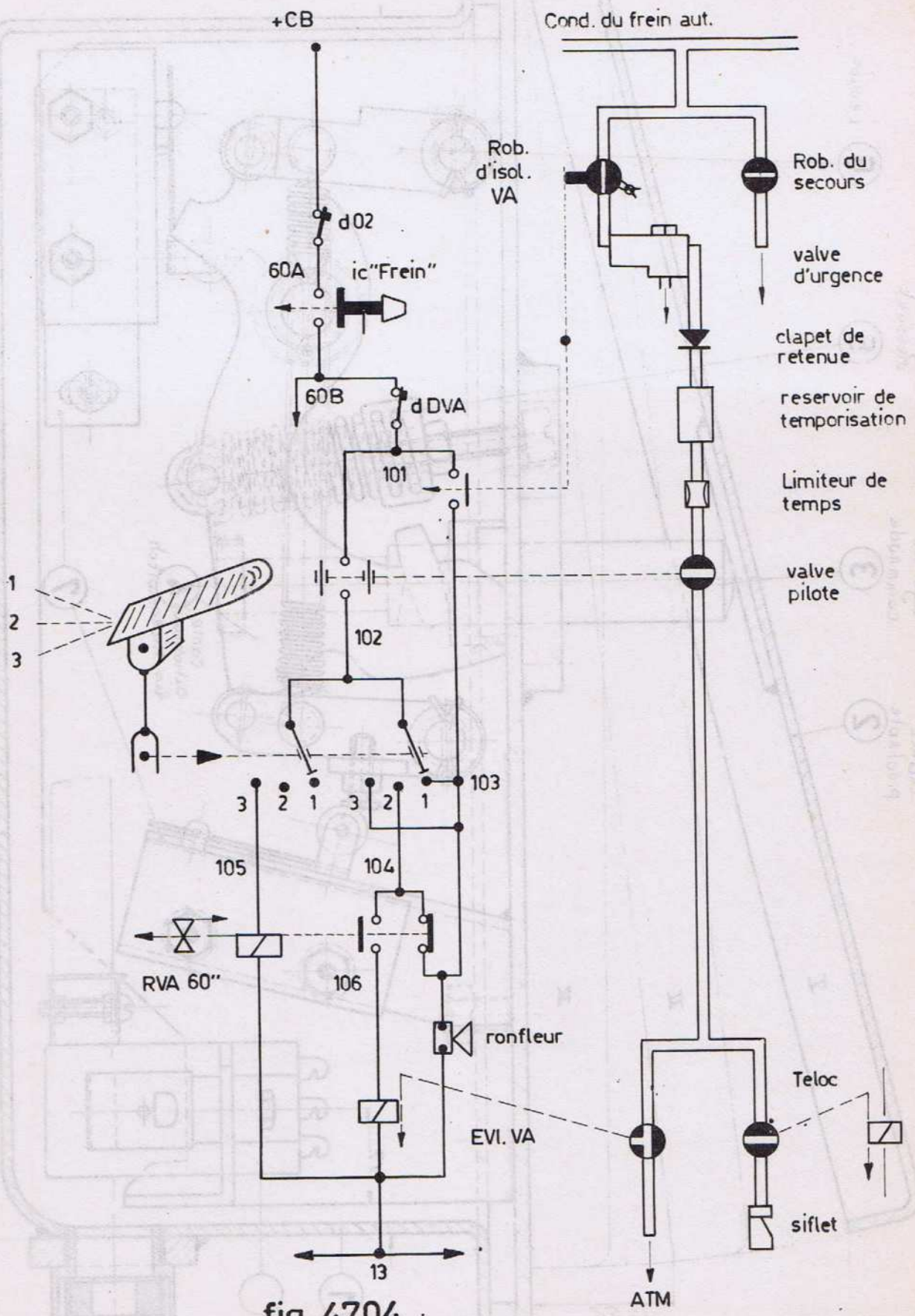


fig. 47.04

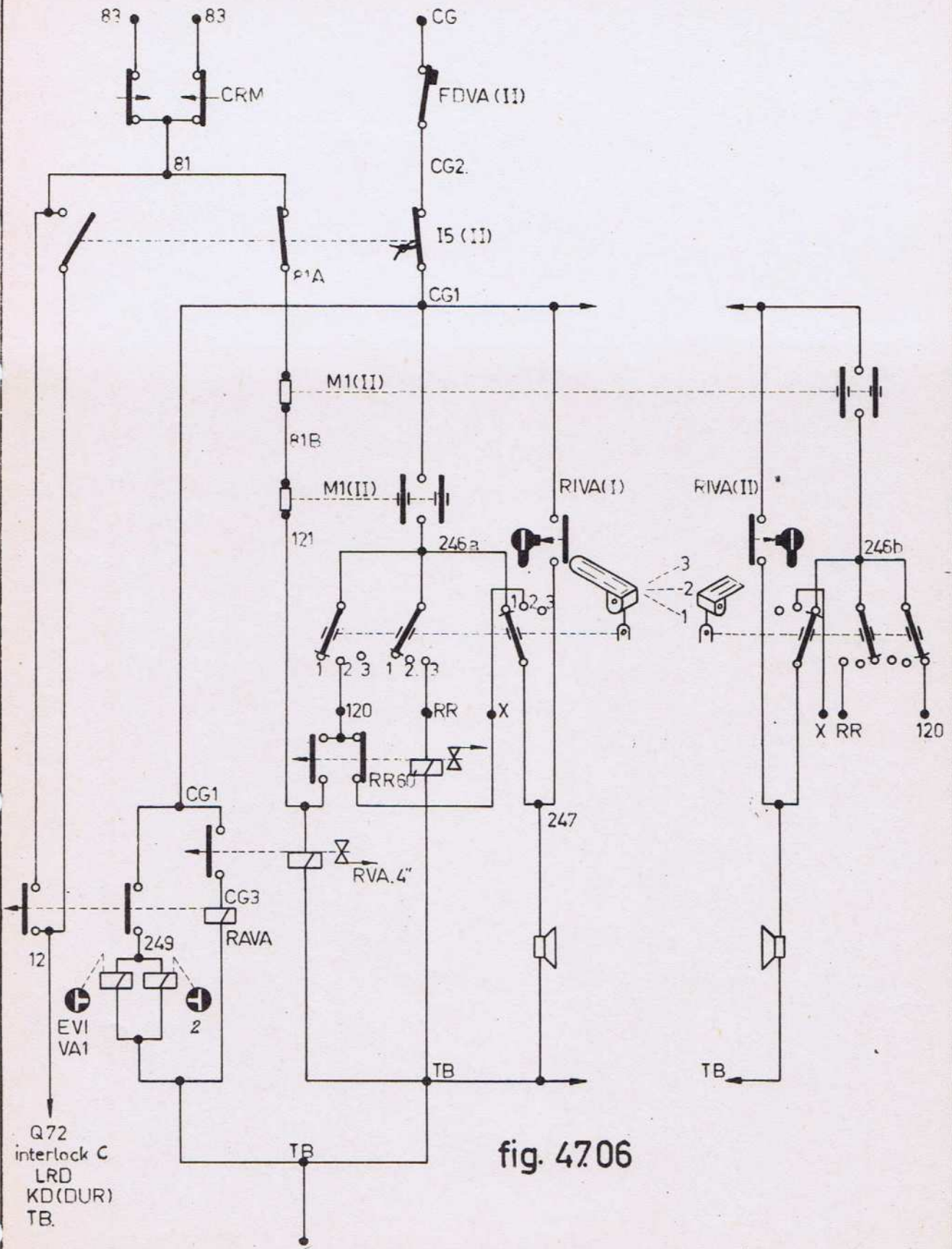


fig. 47.06

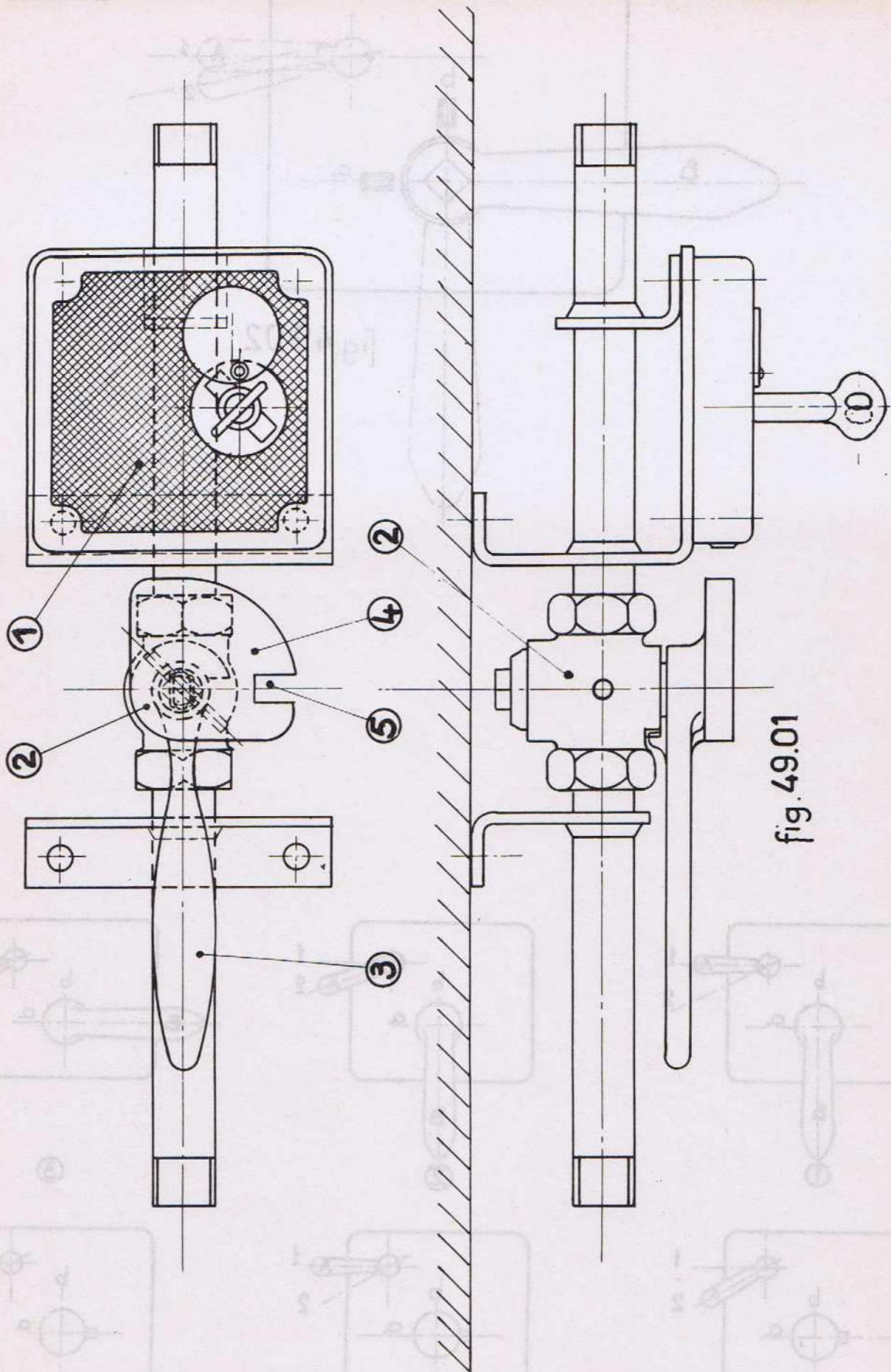


fig. 49.01

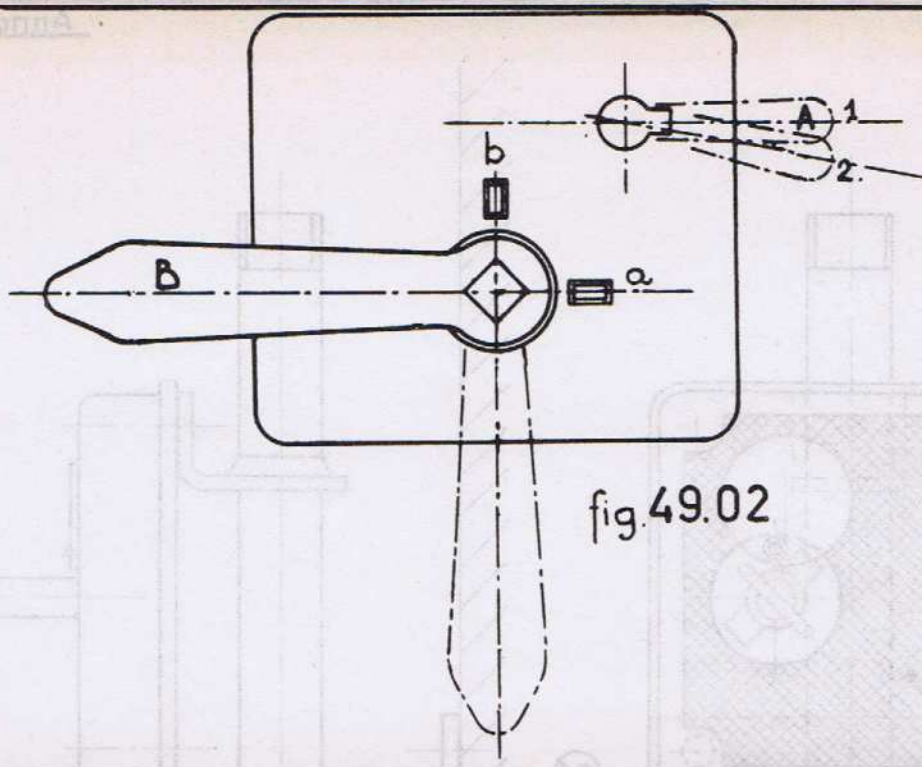


fig.49.02

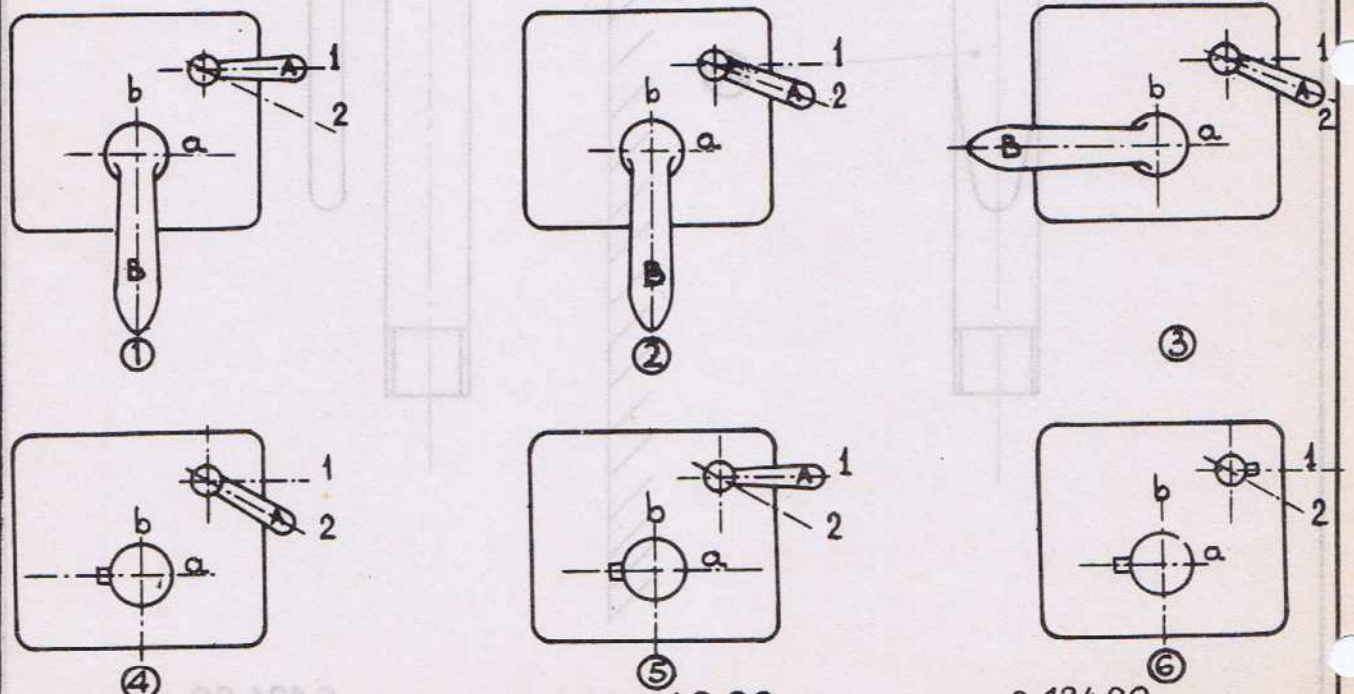


fig.49.03

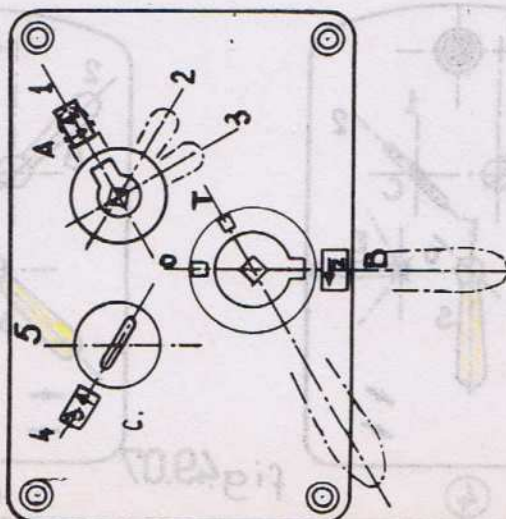
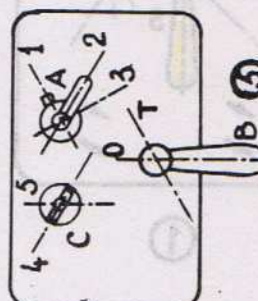
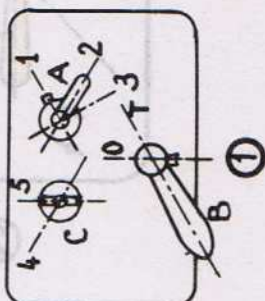
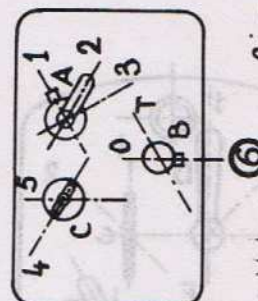
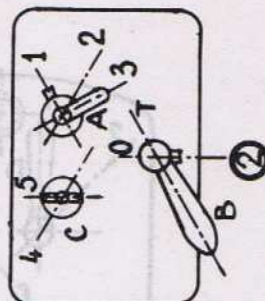
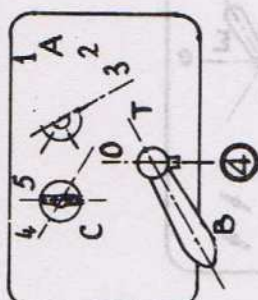
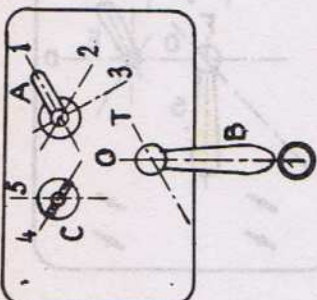
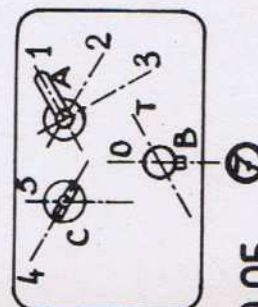
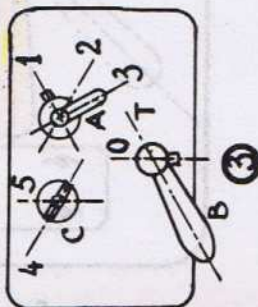
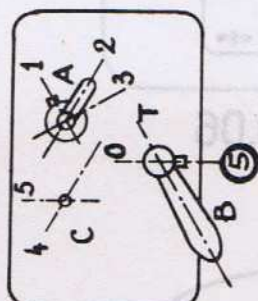
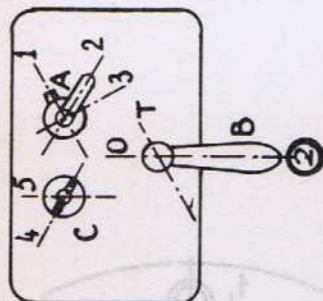
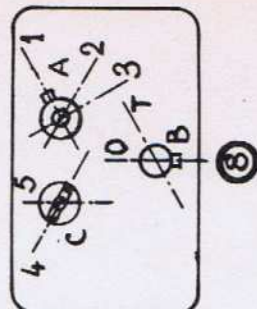
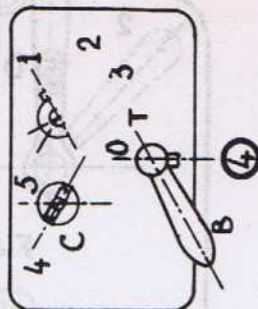
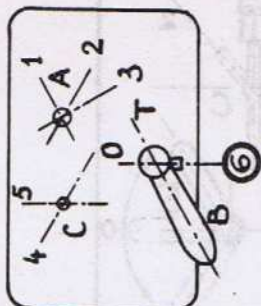
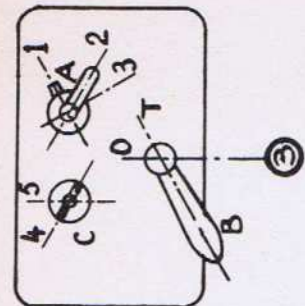


fig.49.04

fig.49.05

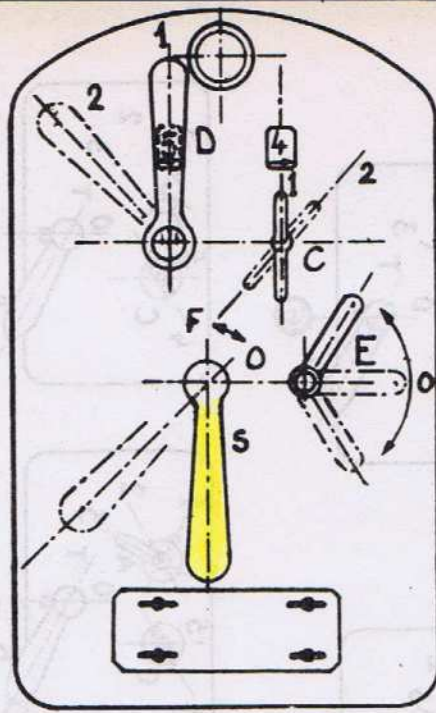
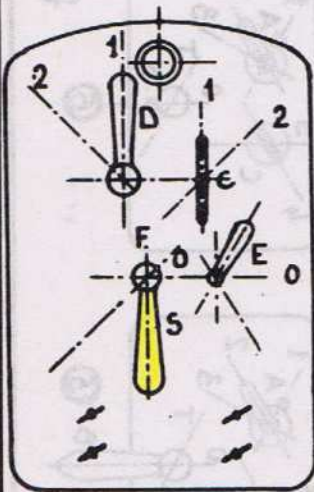
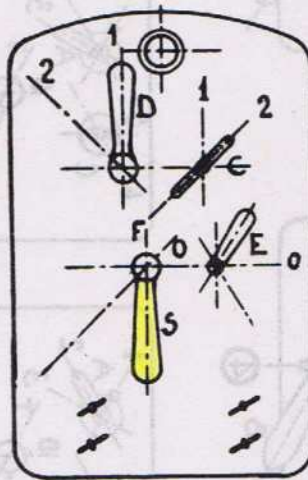


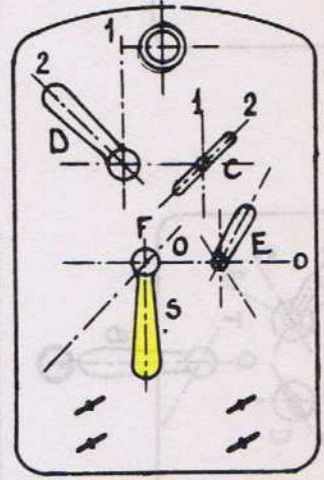
fig. 49.06



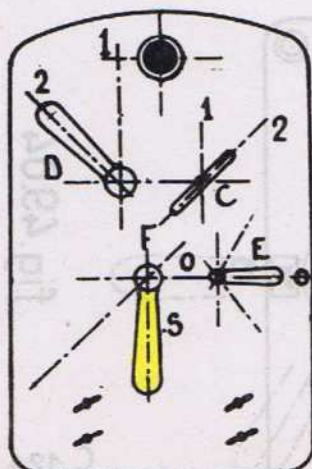
①



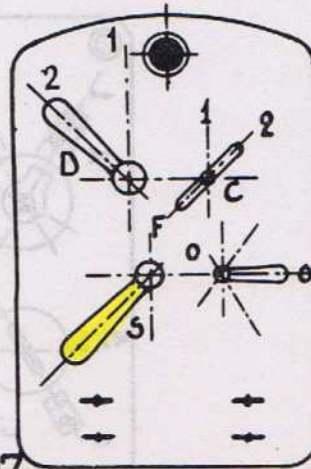
②



③



④



⑤

fig. 49.07

5/ inp

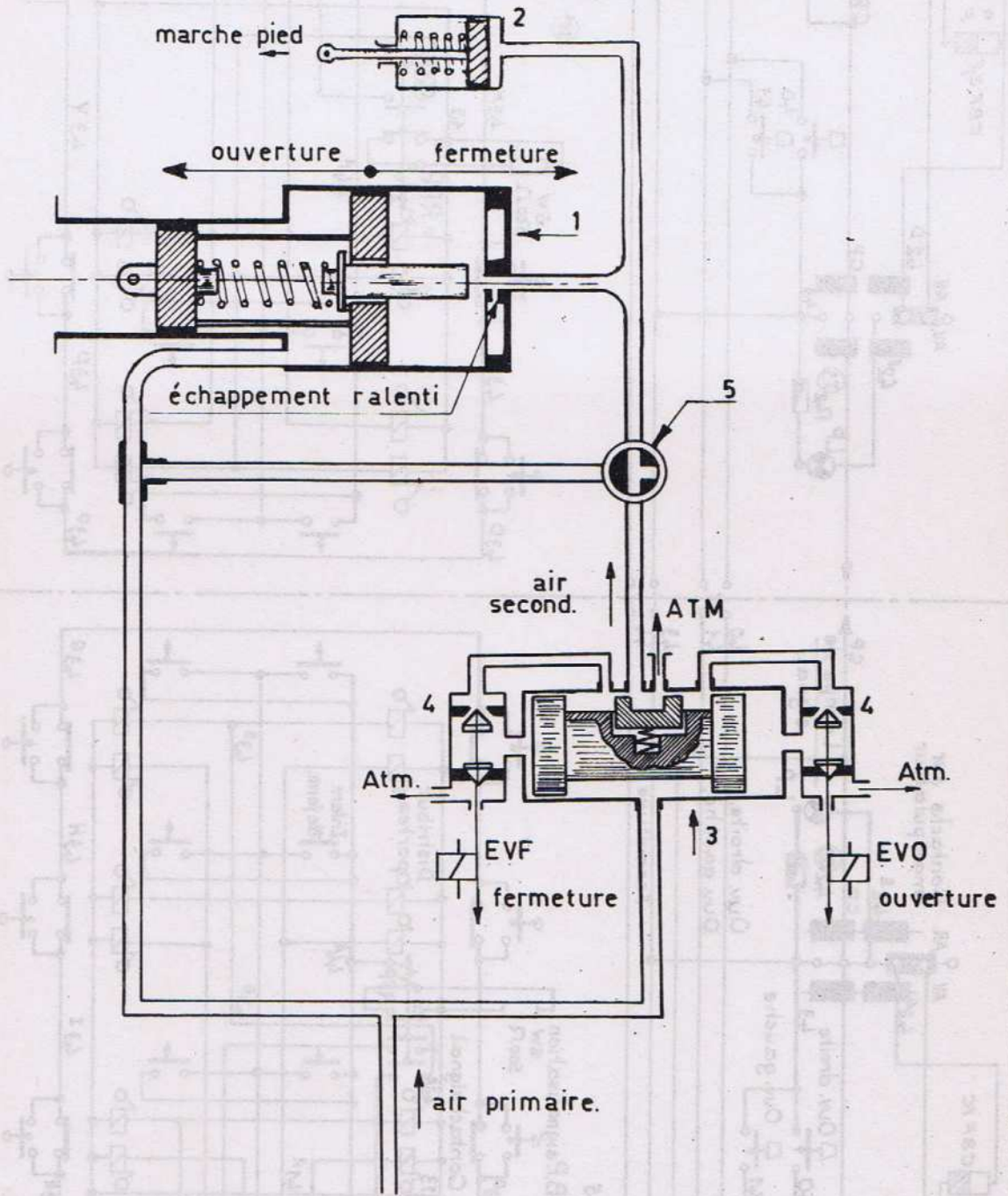
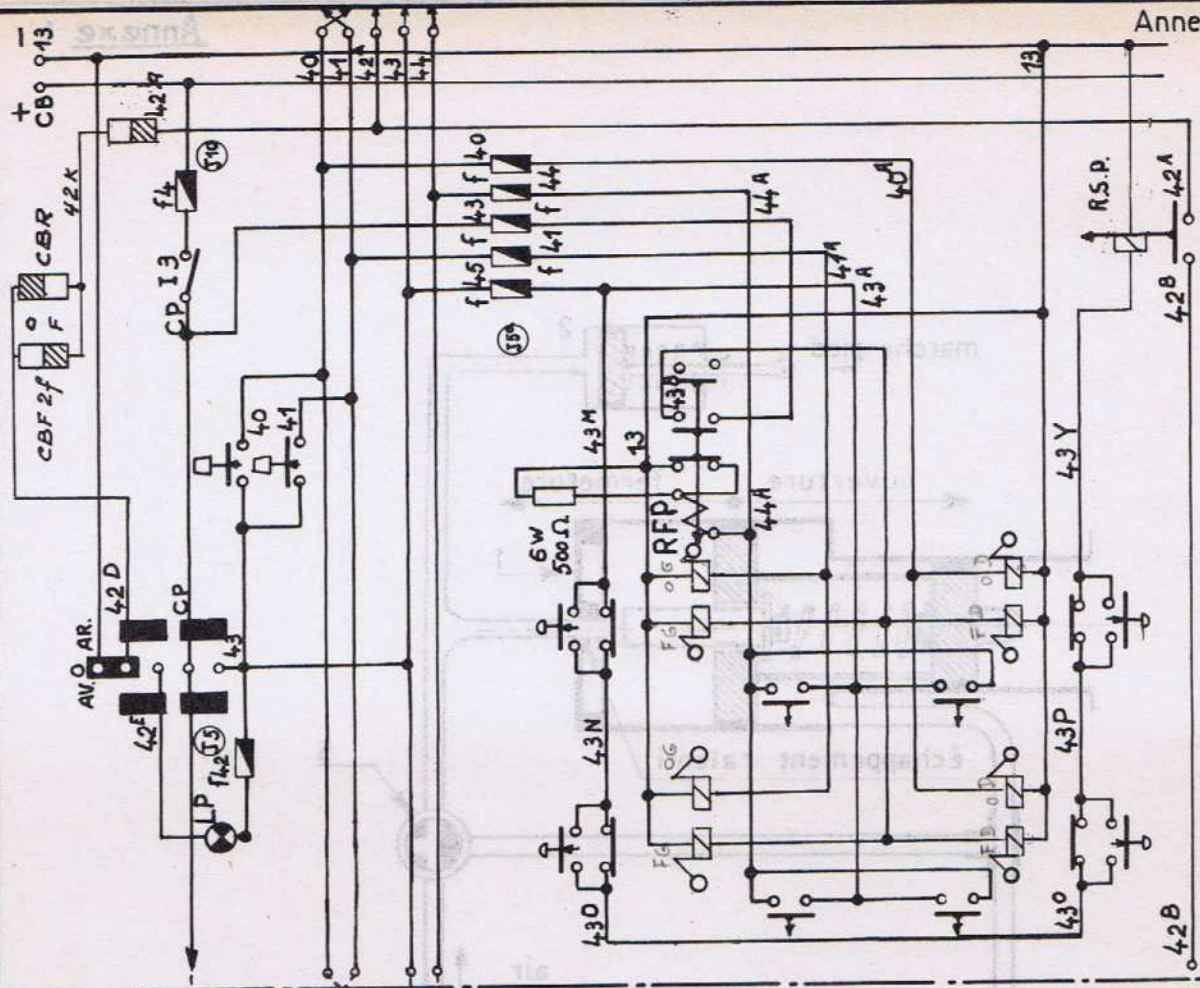


fig. 50.01

Porte Simple

Pc 1



Pc 2

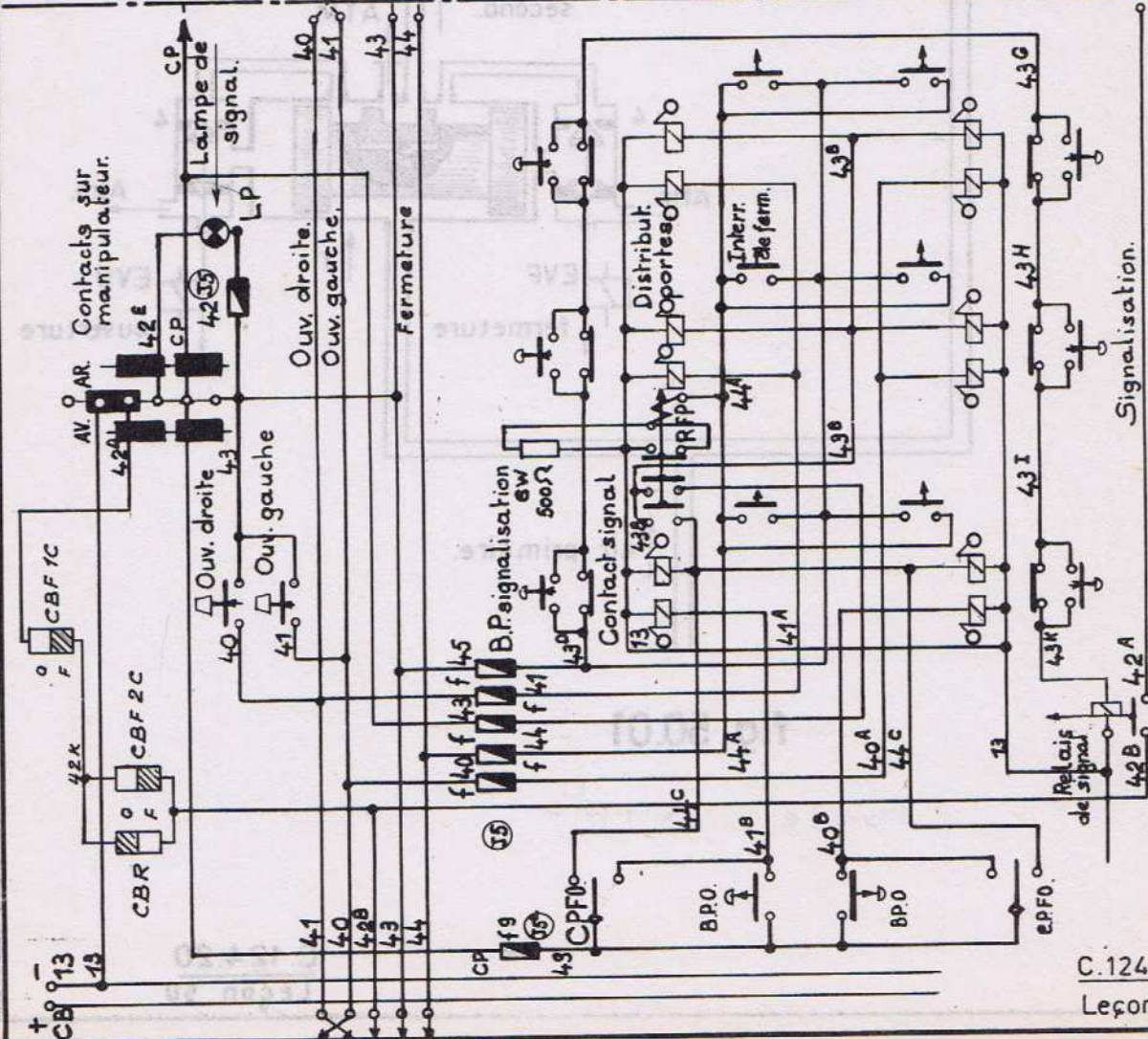


Fig. 50.02.

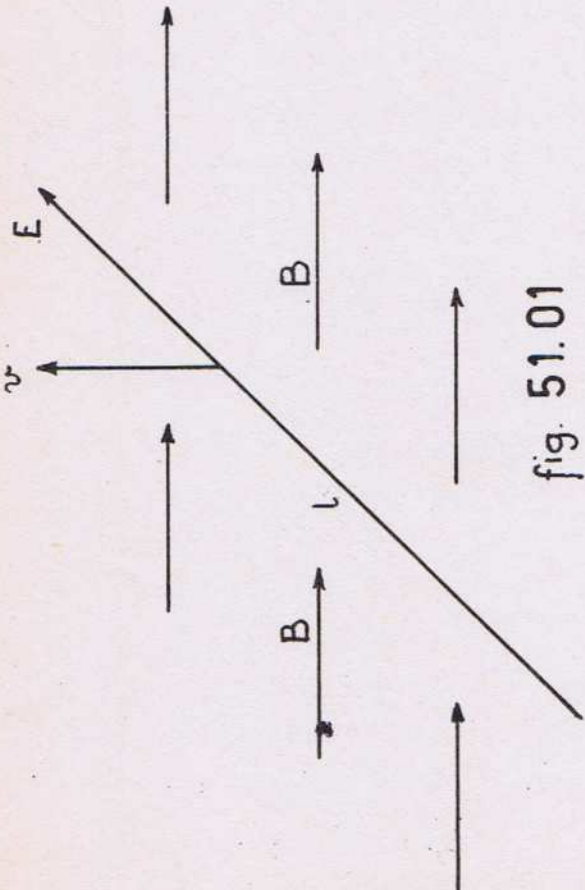


fig. 51.01

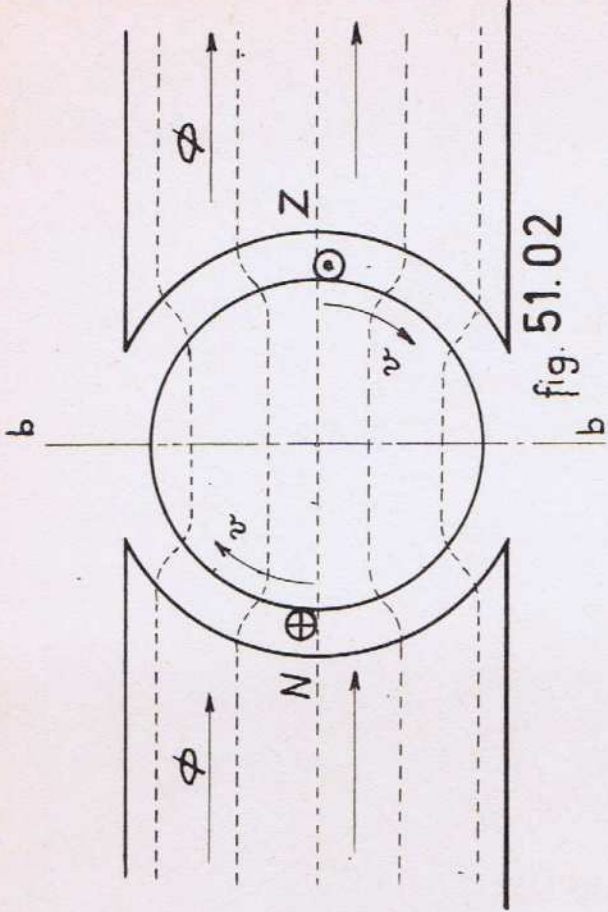


fig. 51.02

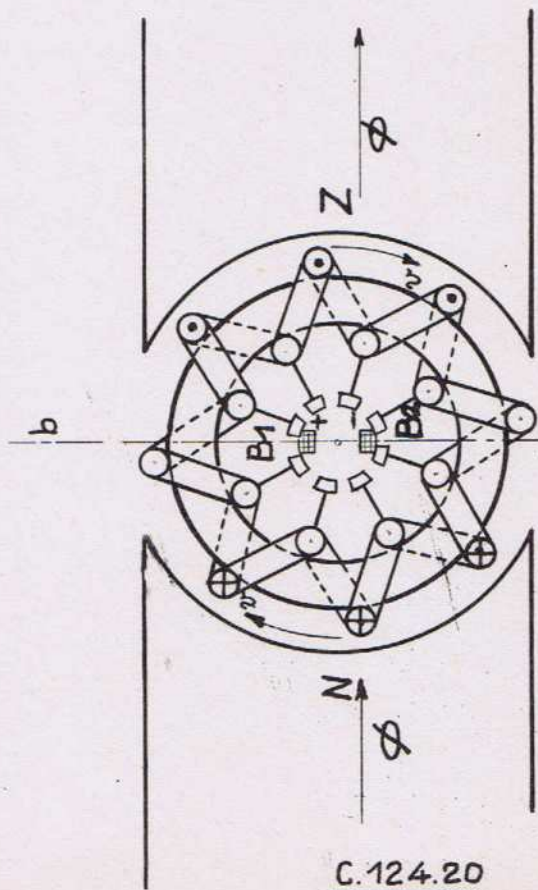


fig. 51.03

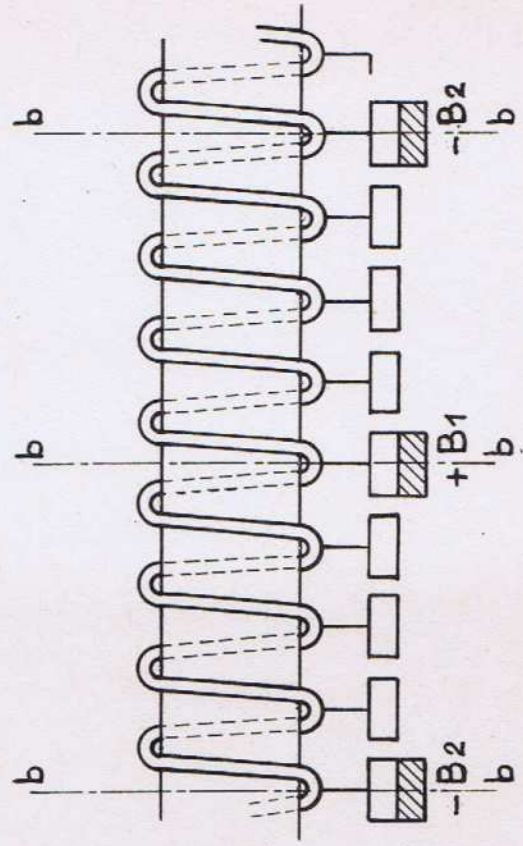


fig. 51.04

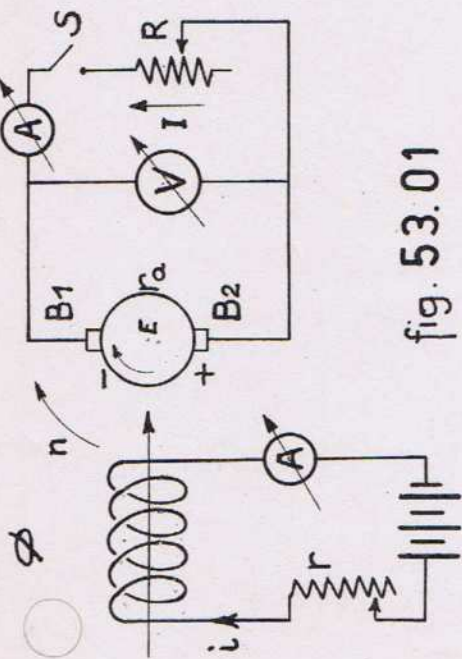


fig. 53.01

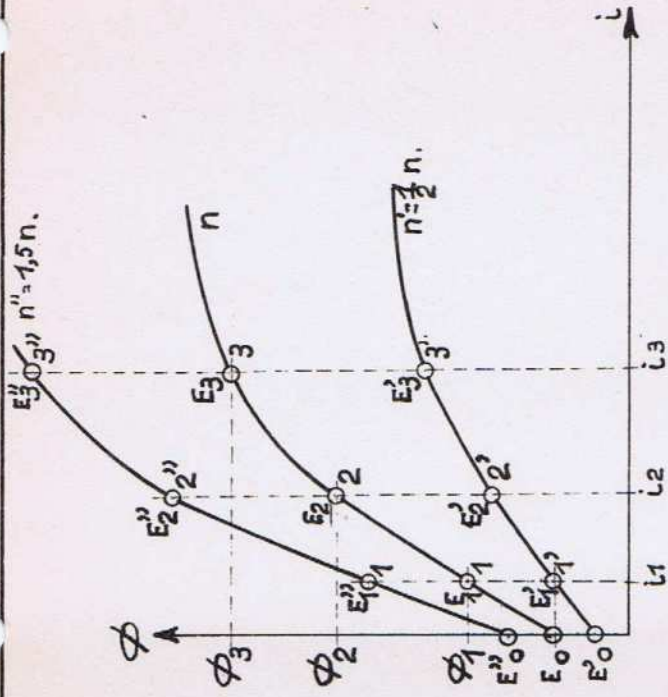


fig. 53.02

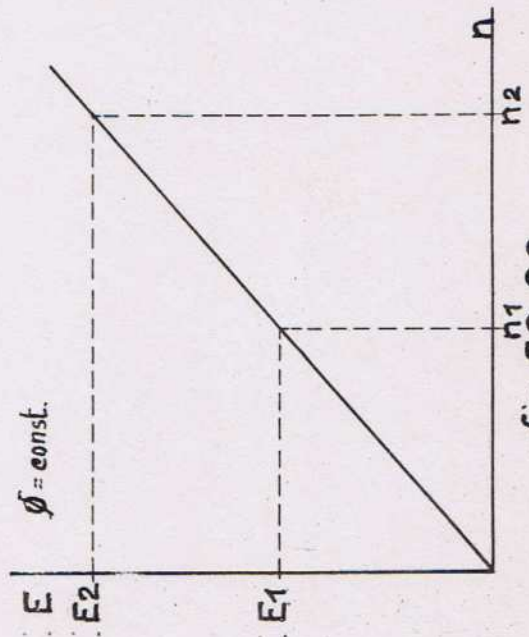


fig. 53.03

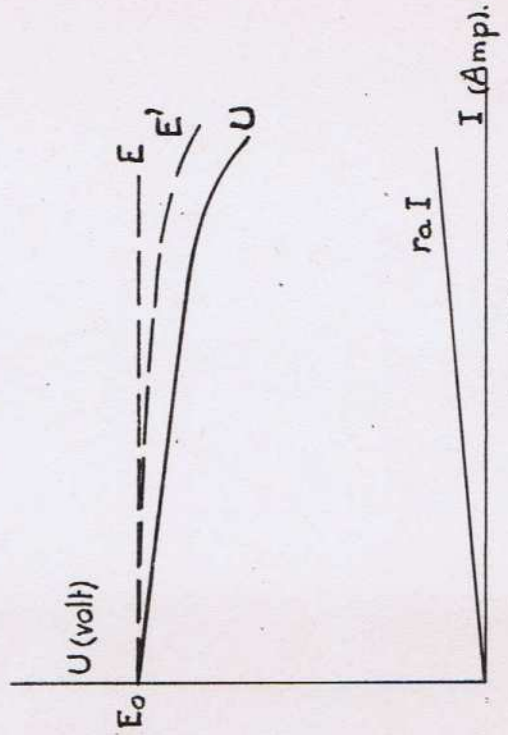


fig. 53.04

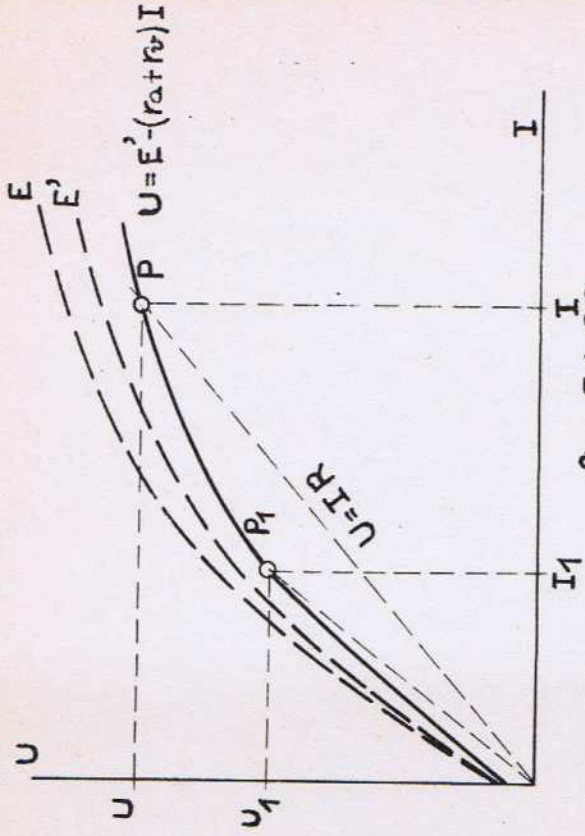


fig. 54.02

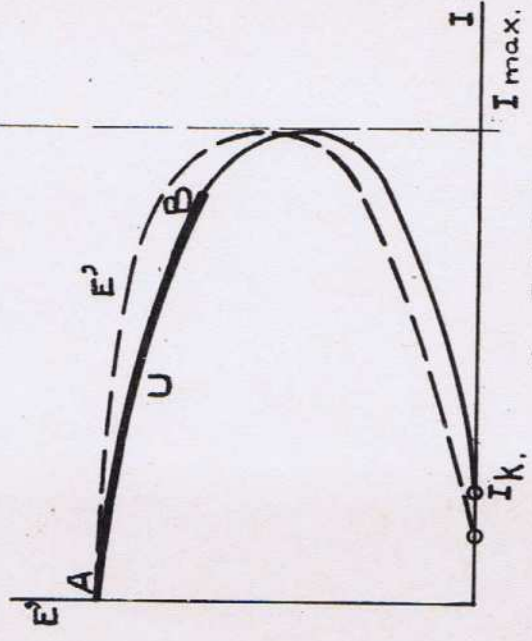


fig 54.04

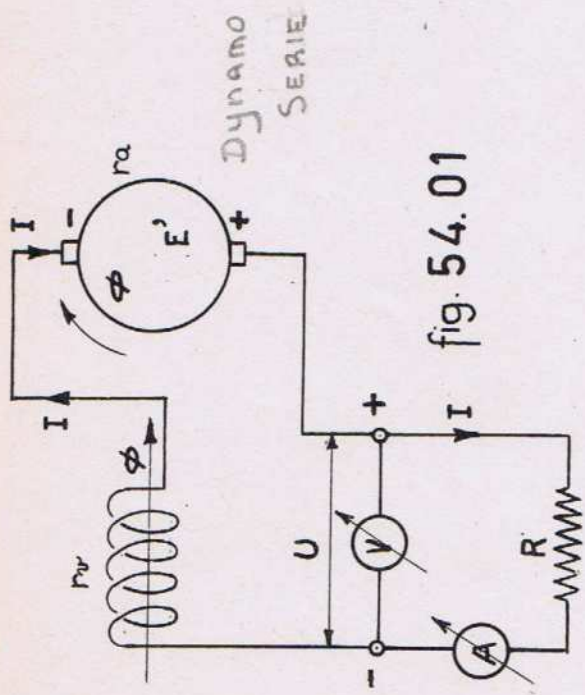


fig. 54.01

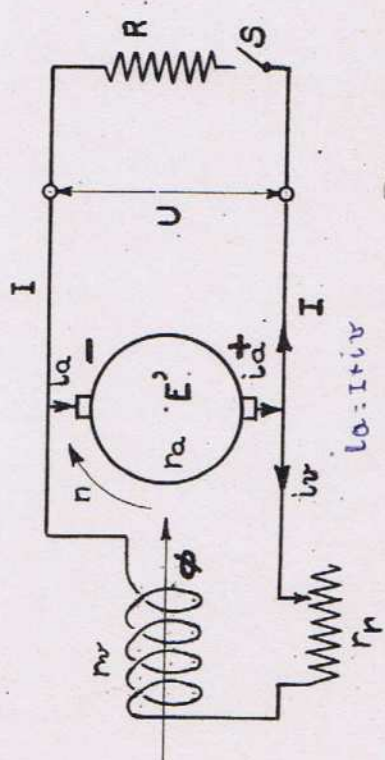


fig. 54.03

Dynamo compound

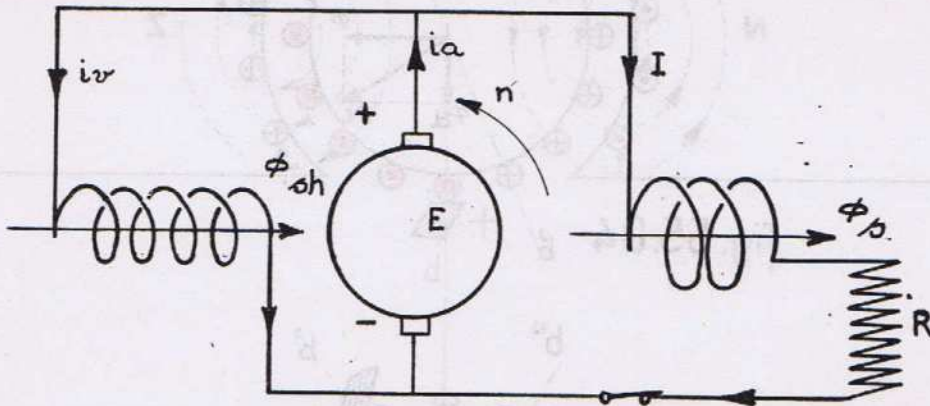


fig. 55.01

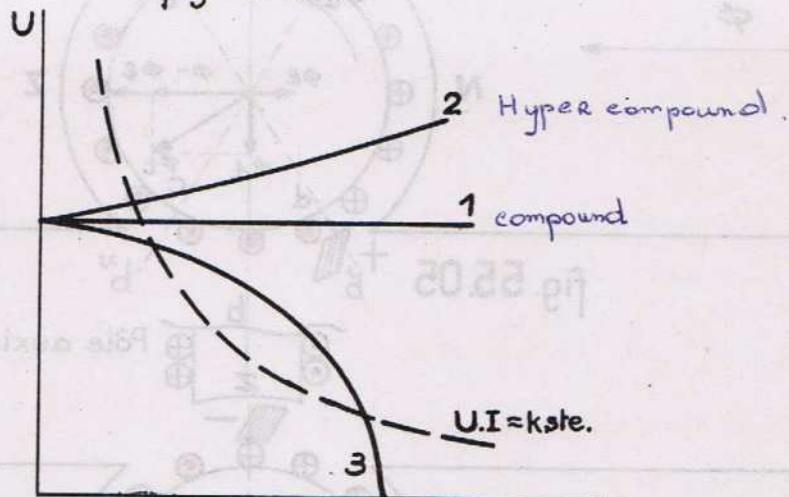


fig. 55.02 Type compound

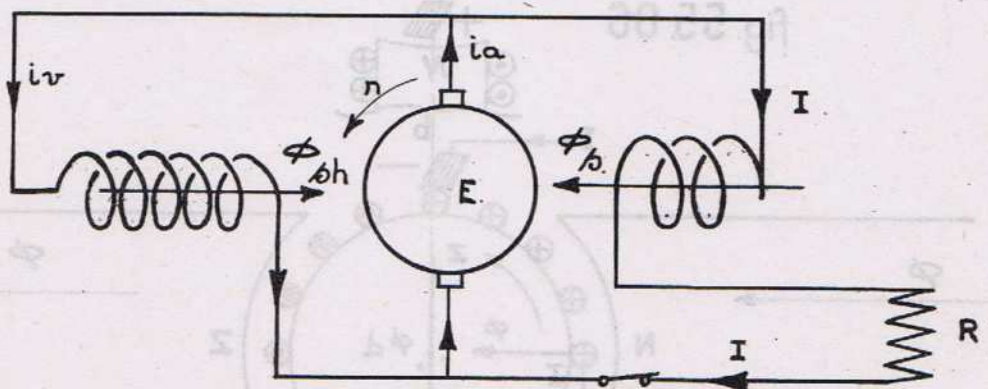


fig. 55.03

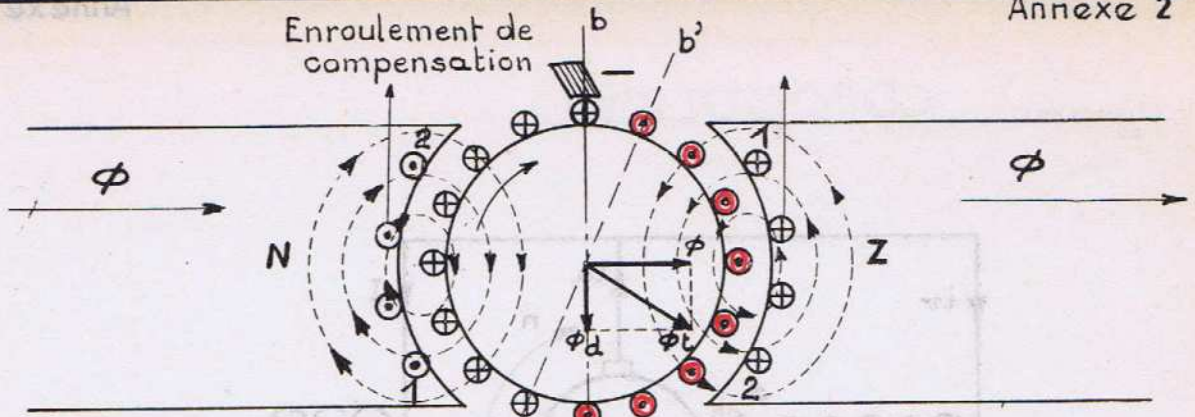


fig. 55.04

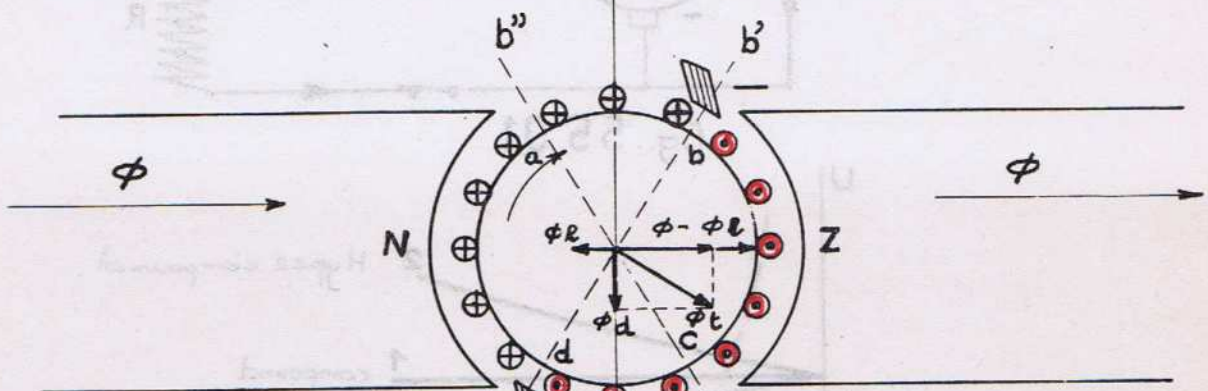


fig. 55.05

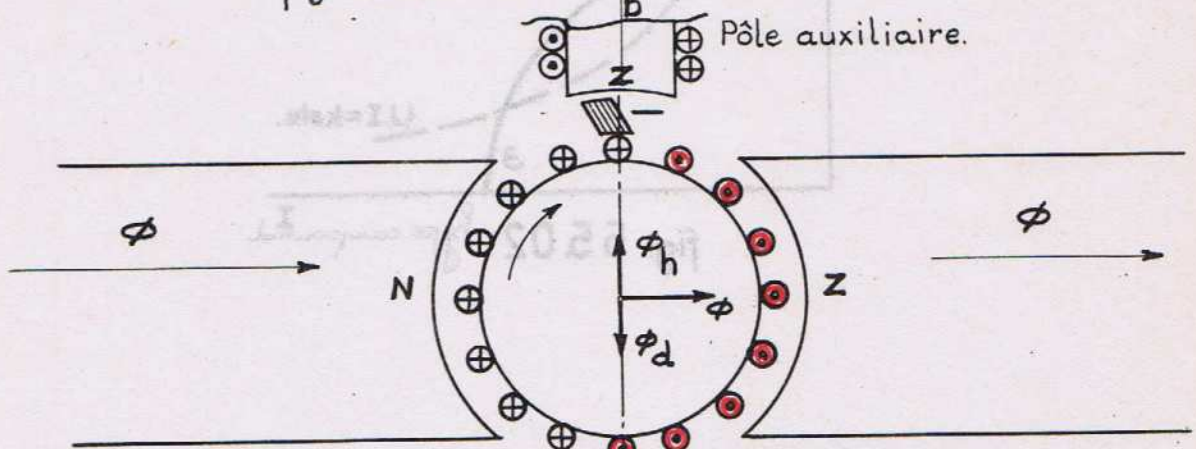


fig. 55.06

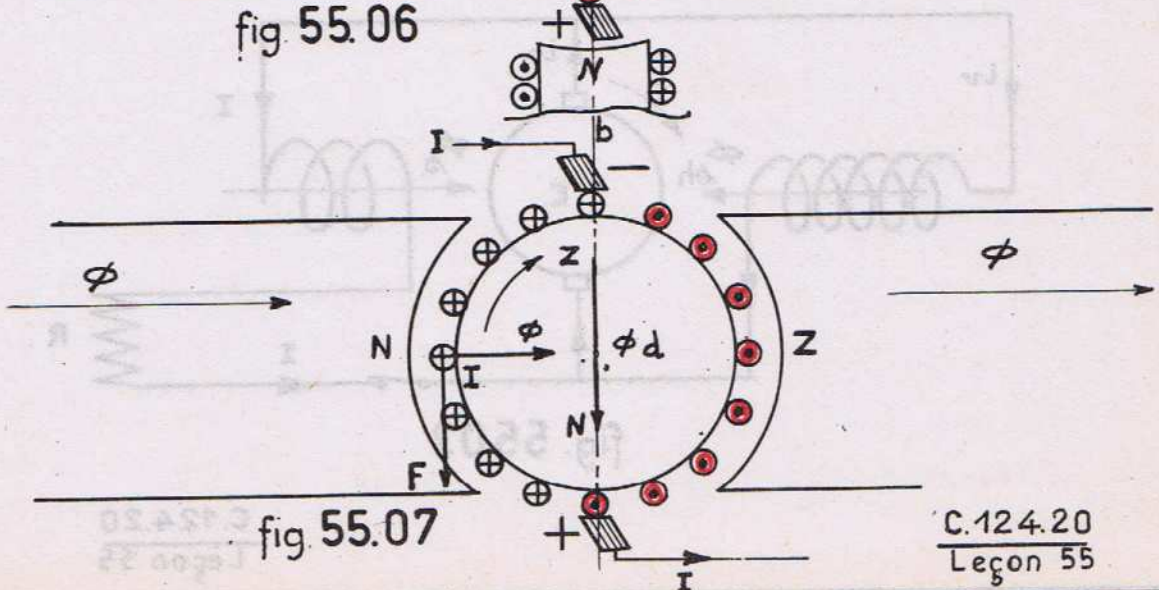


fig. 55.07

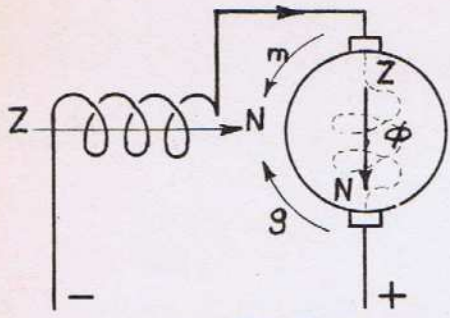


fig. 55.08

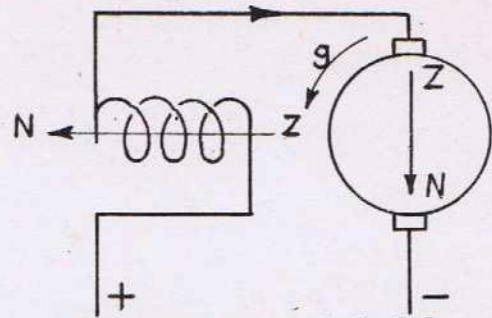


fig. 55.09

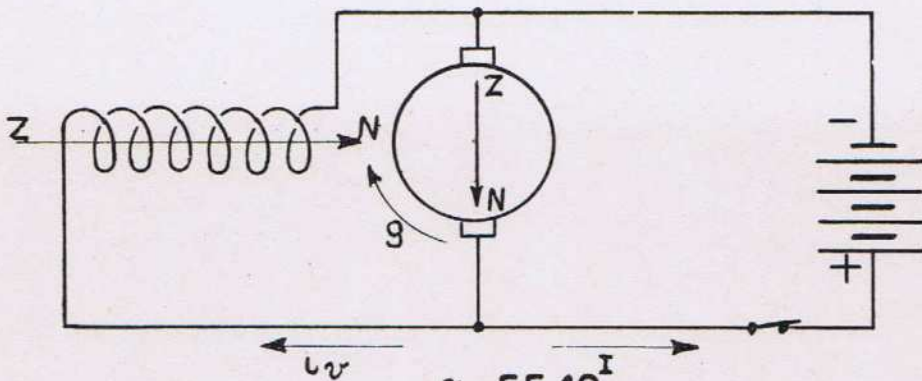


fig. 55.10

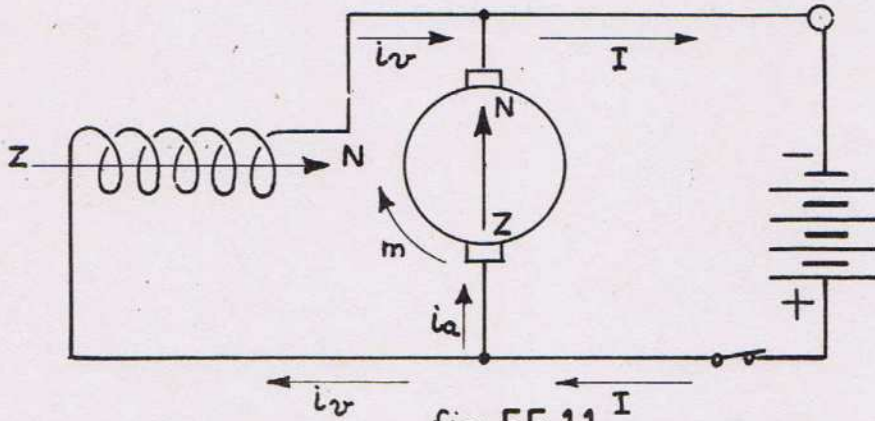


fig. 55.11

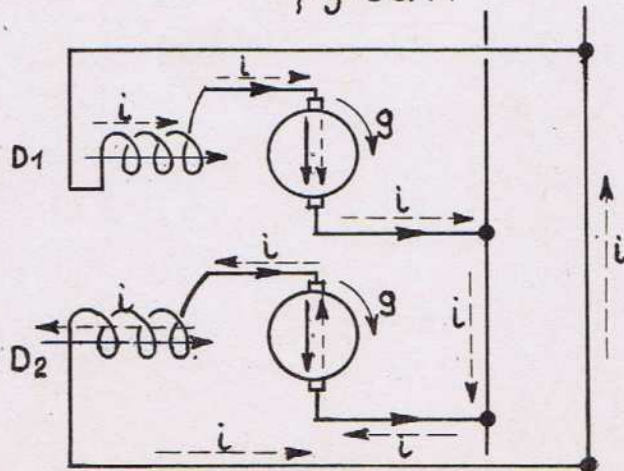


fig. 55.12

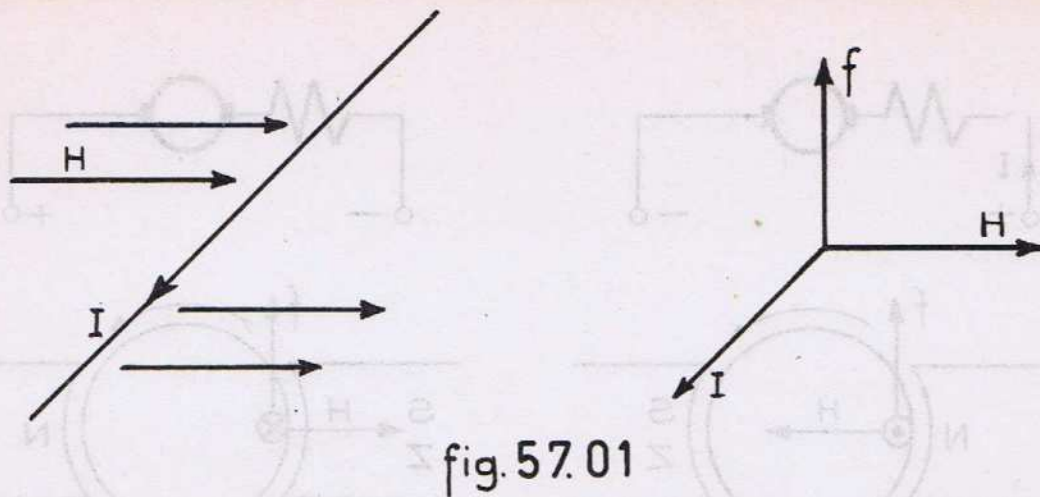


fig. 57.01

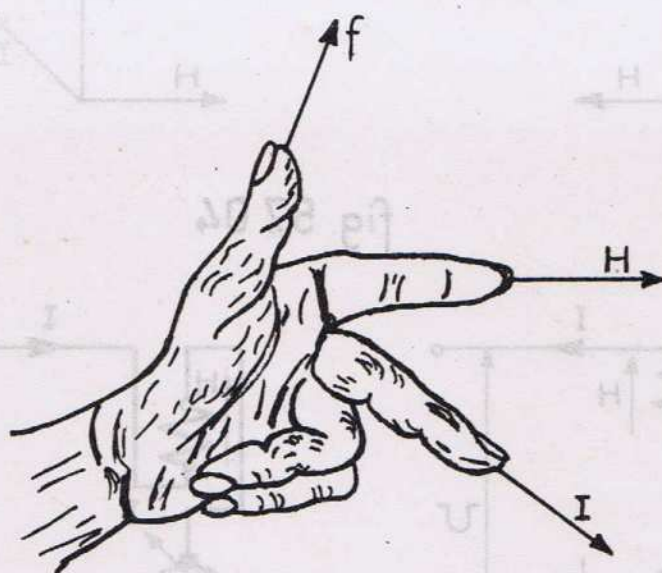


fig. 57.02

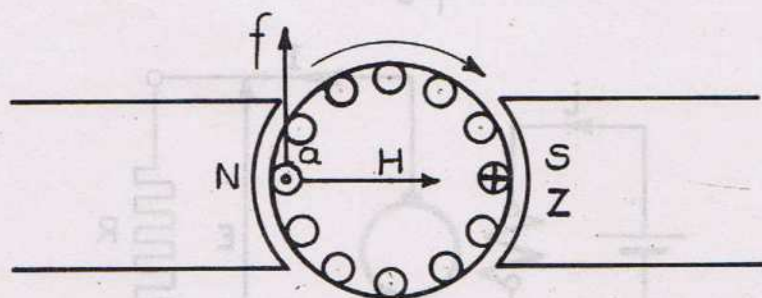


fig. 57.03

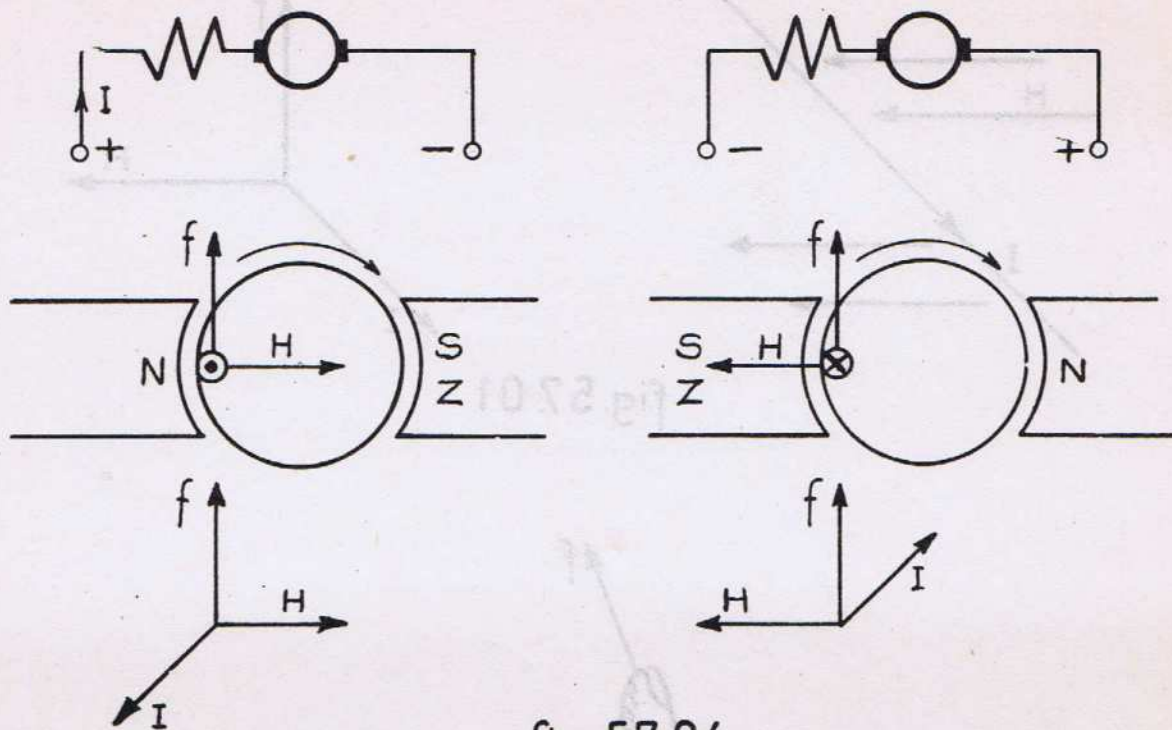


fig. 57.04

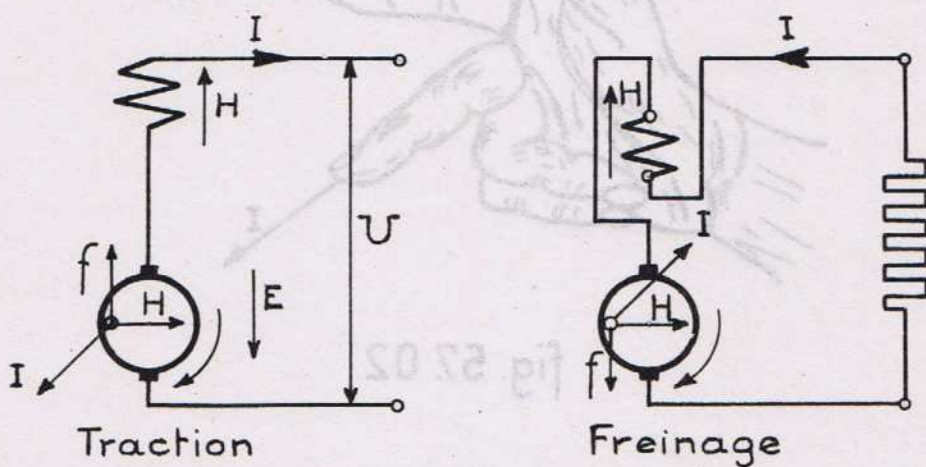


fig 57.05

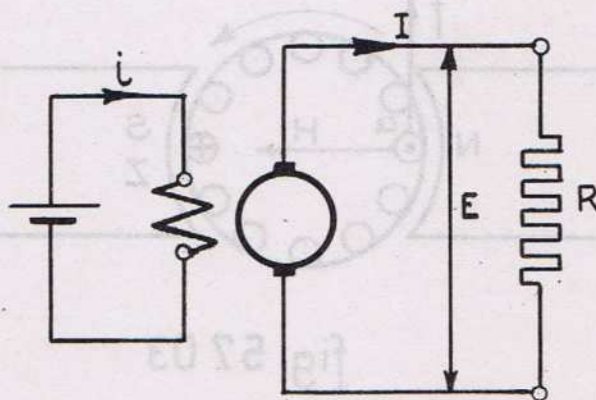


fig. 57.06

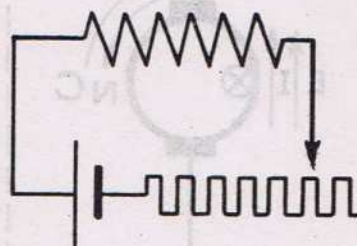
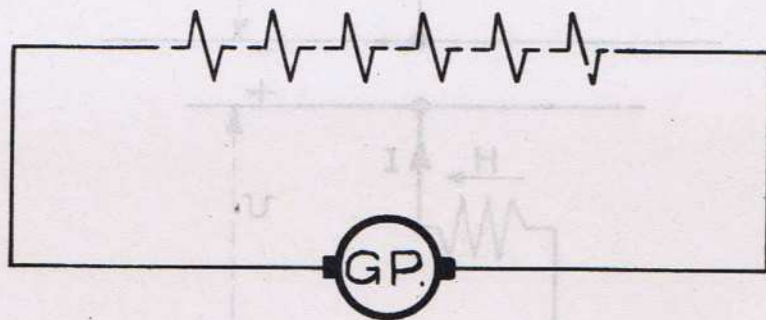
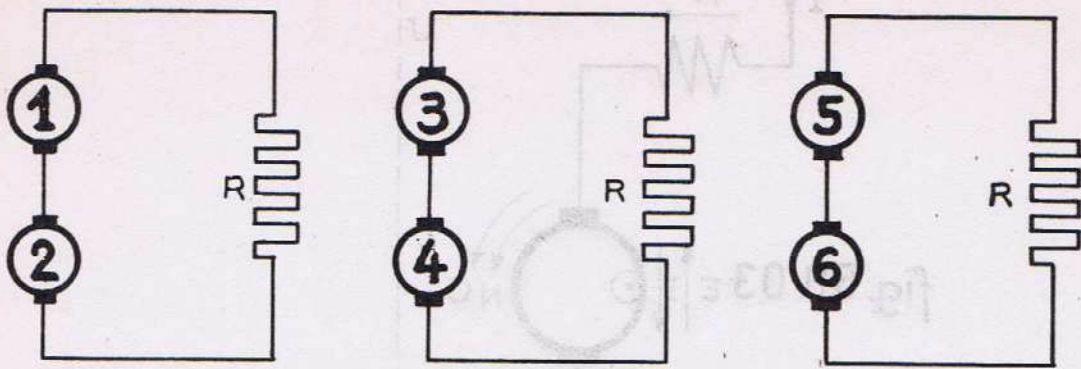


fig. 58.01.

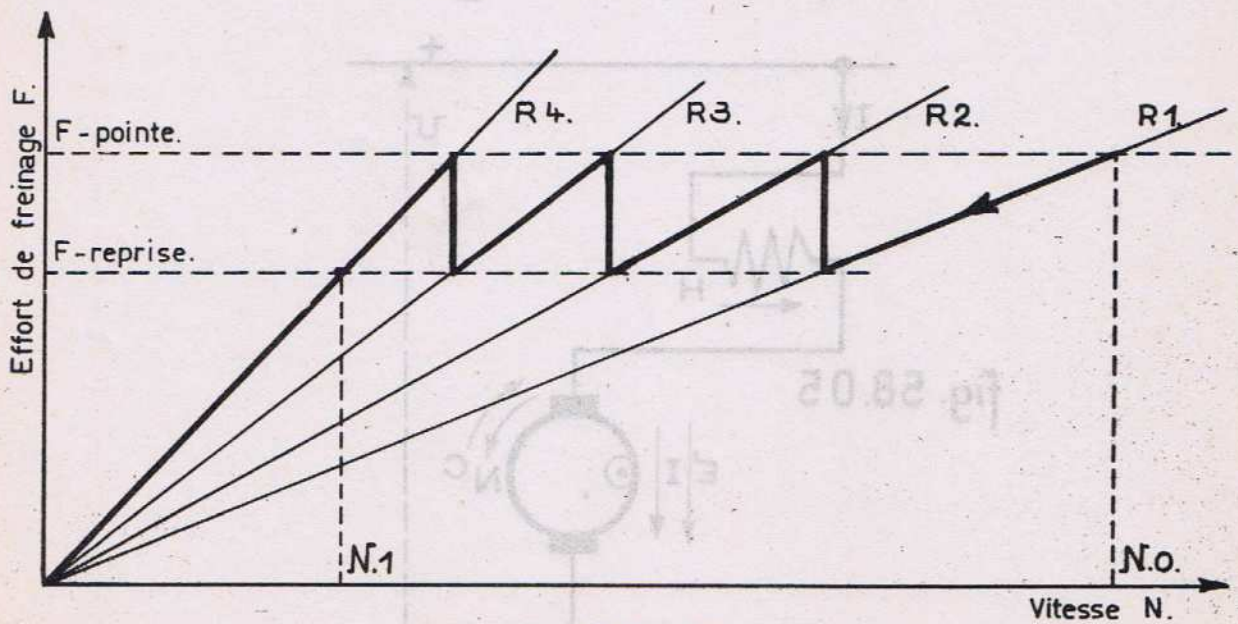
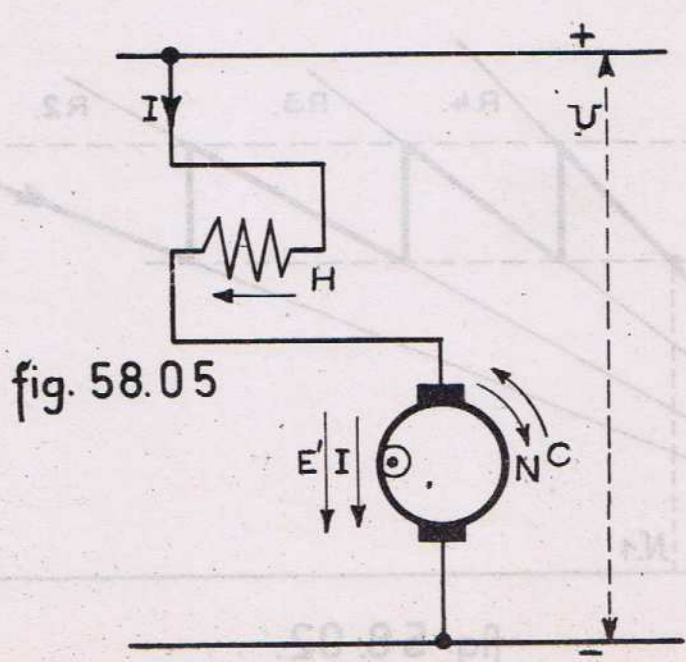
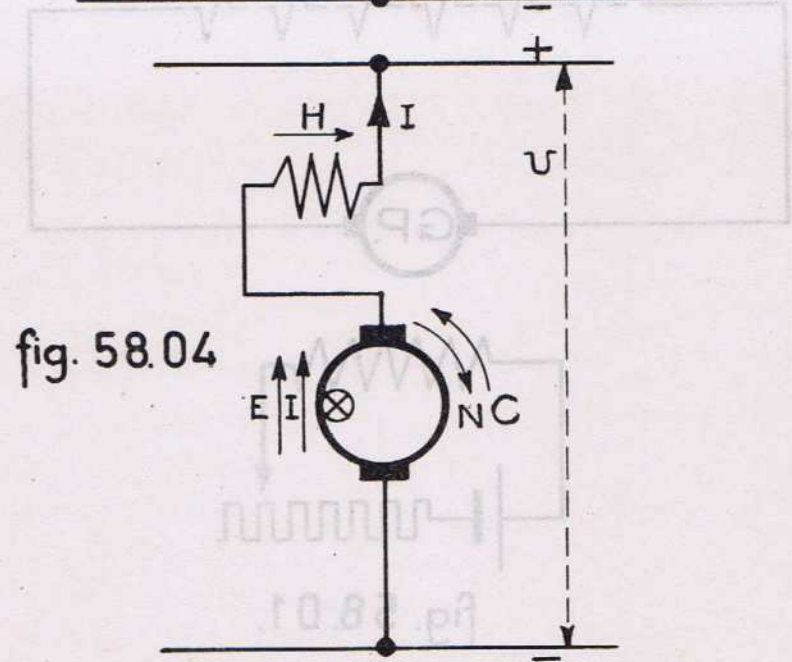
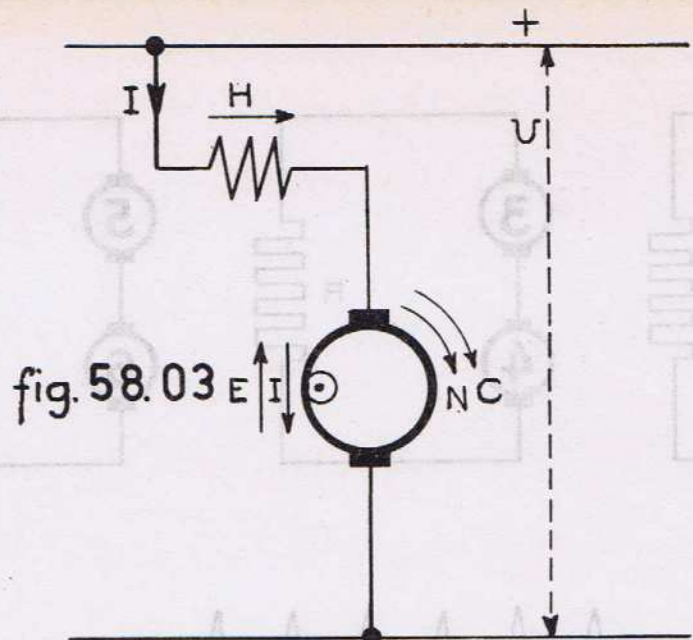


fig. 58.02.



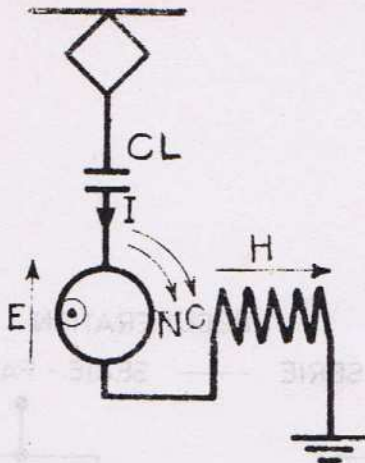


fig 59.01

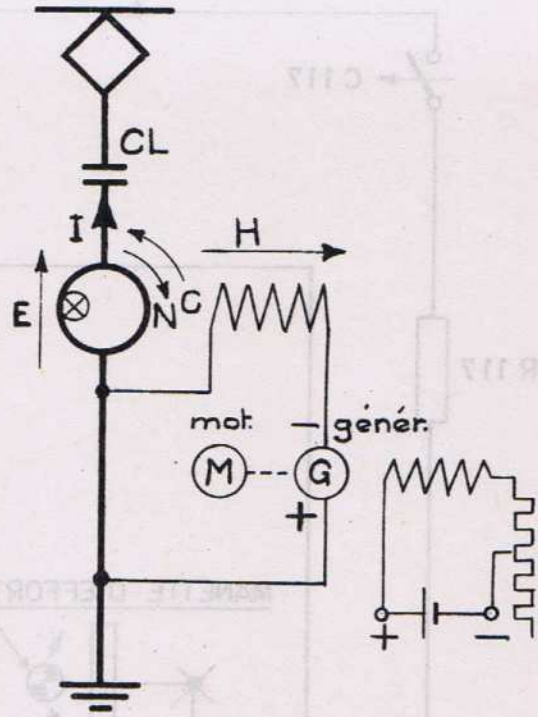


fig. 59.02

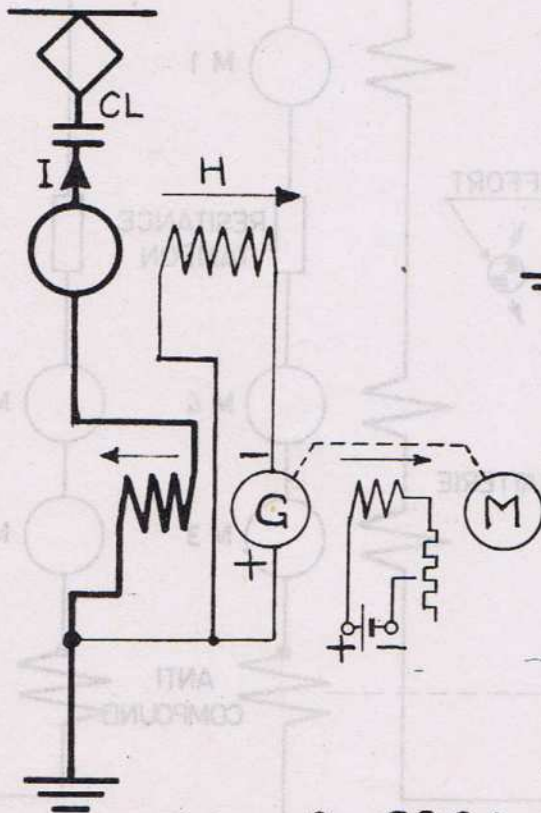


fig. 59.04

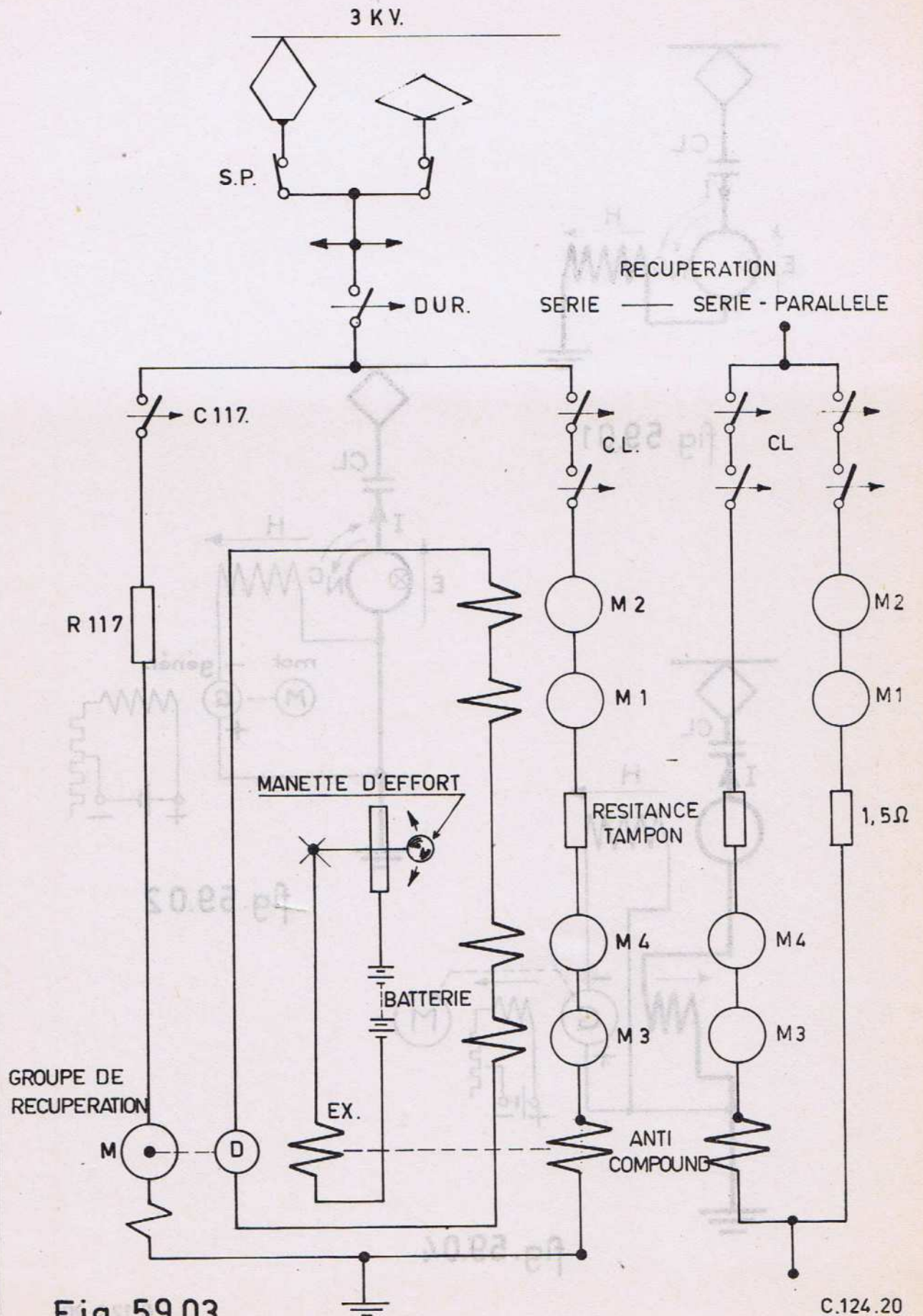


Fig. 59.03.

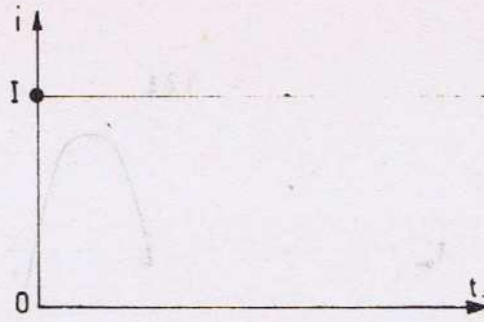


Fig. 61.01.a

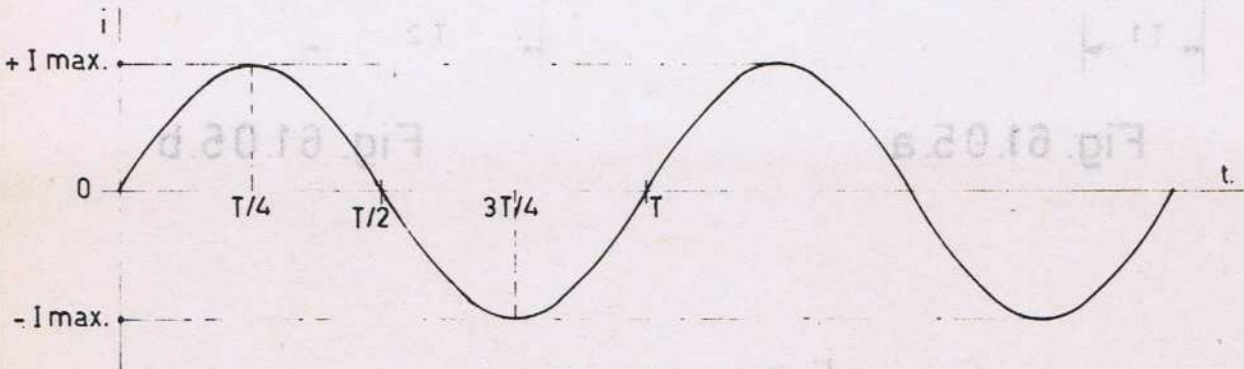


Fig. 61.01.b

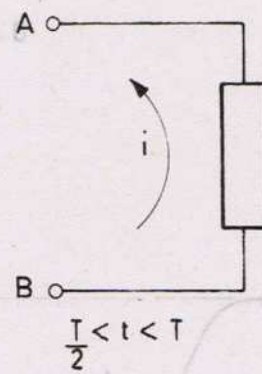
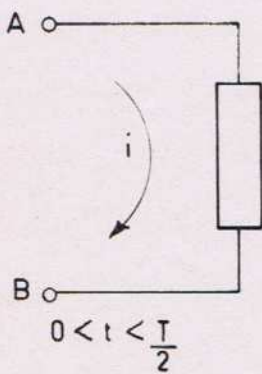


Fig. 61.02.

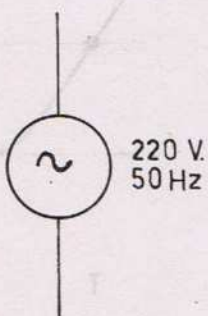


Fig. 61.03.

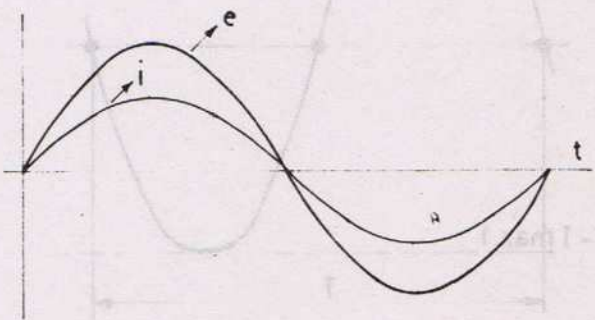


Fig. 61.04.

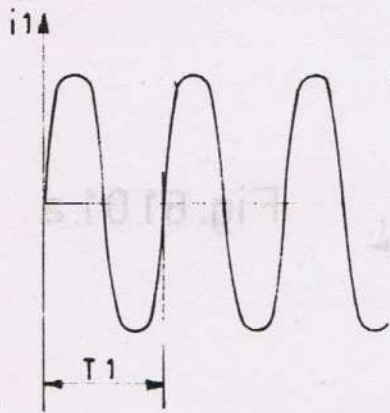


Fig. 61.05.a

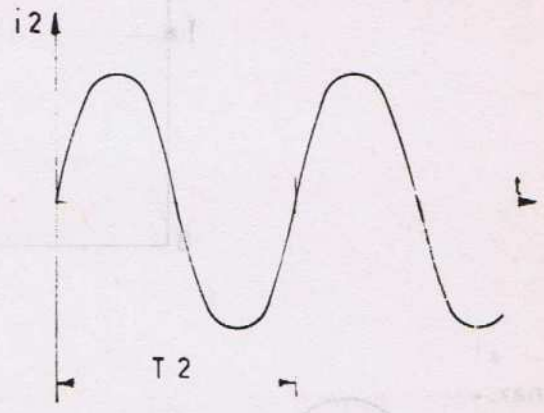


Fig. 61.05.b

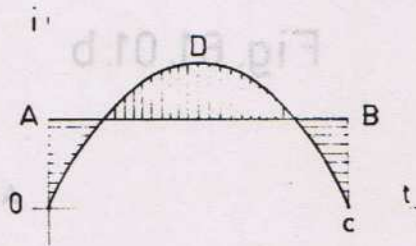


Fig. 61.06.

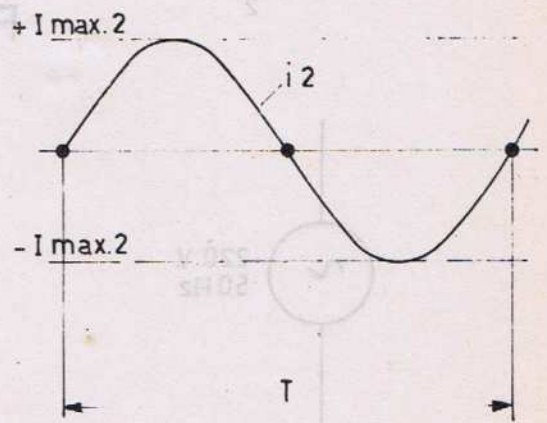
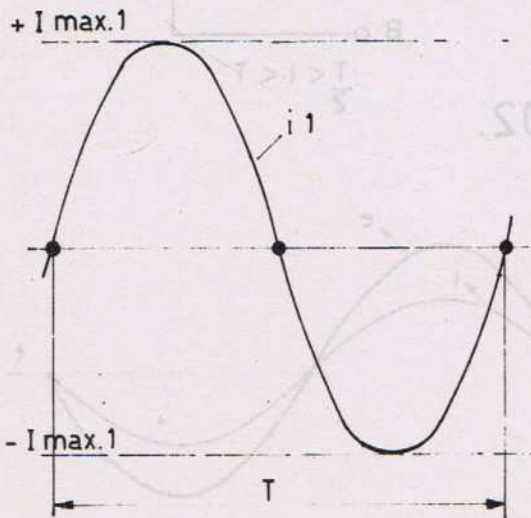


Fig. 61.07.

deux ondes en phase

opposition de phase

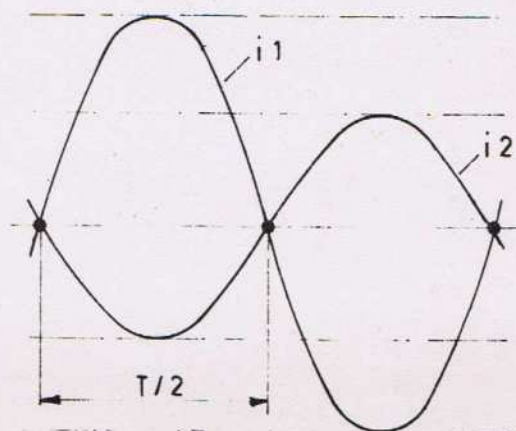
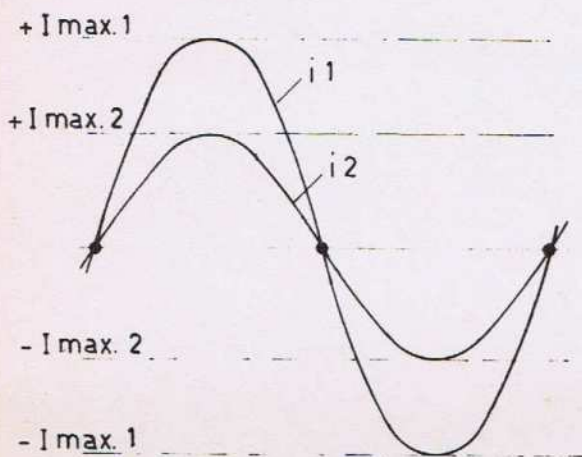


Fig.61.08.a.

Fig.61.08.b.

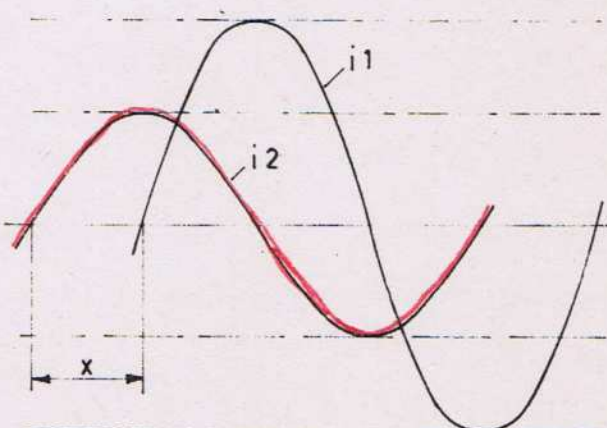
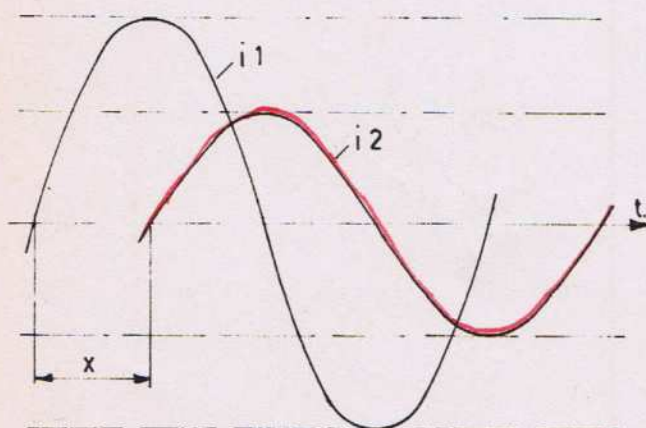


Fig.61.08.c.

Fig.61.08.d.

avancee de phase
tension en avance sur le courant

retard de phase
tension en retard
des courant

- courant rouge
- tension noir

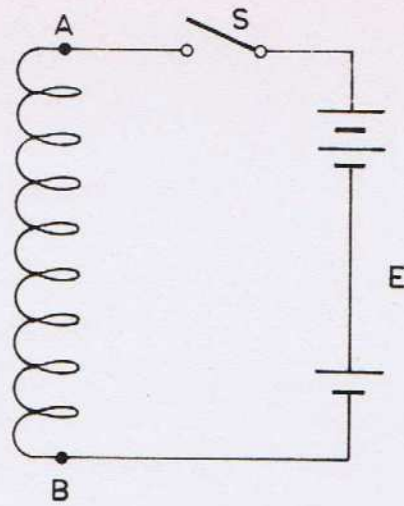


Fig. 62.01.

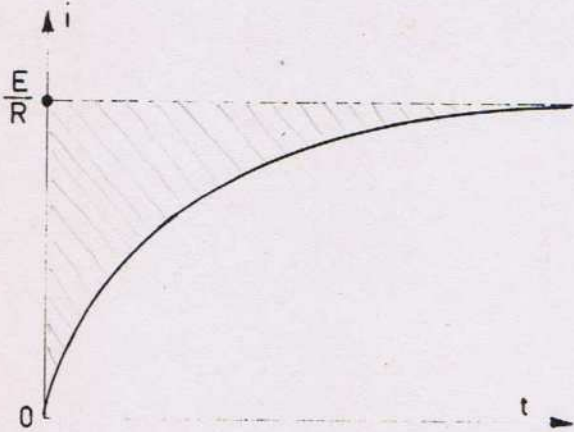


Fig. 62.02

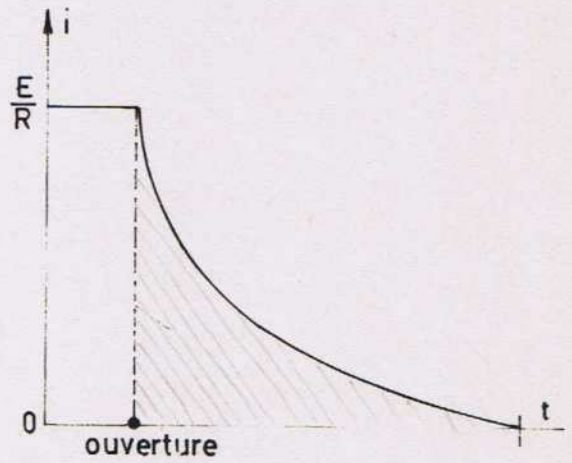


Fig. 62.03.

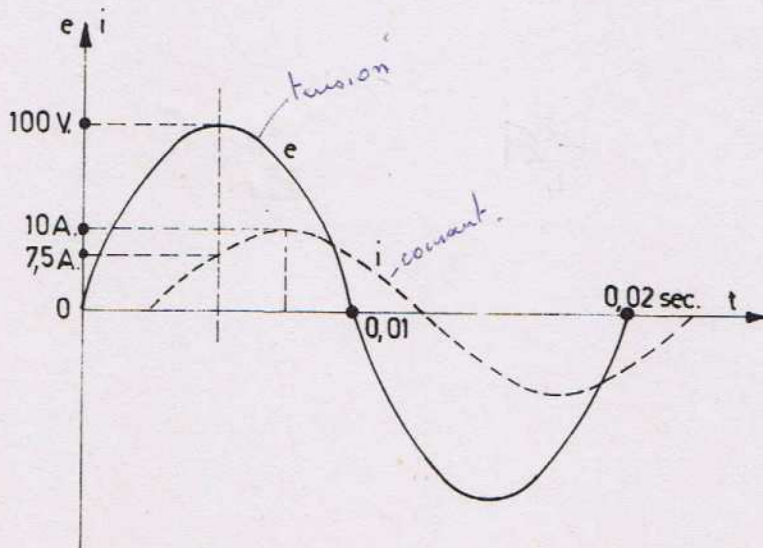


Fig. 62.04.

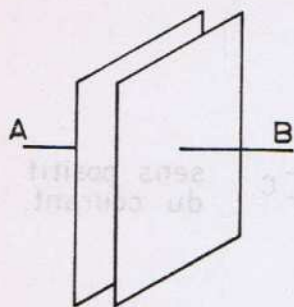


Fig. 63.01.

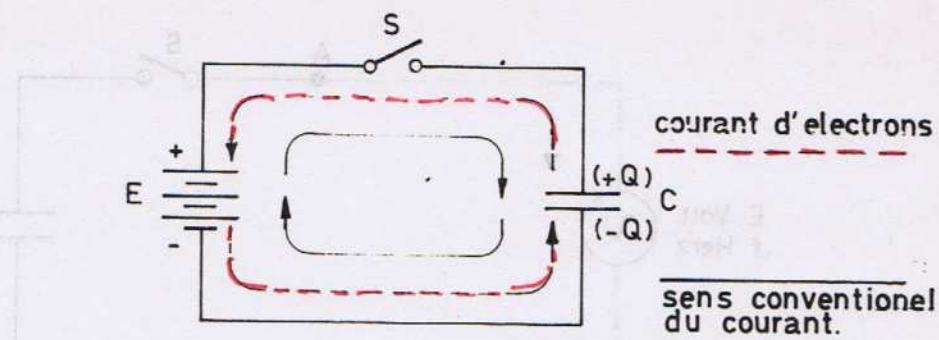


Fig. 63.02.

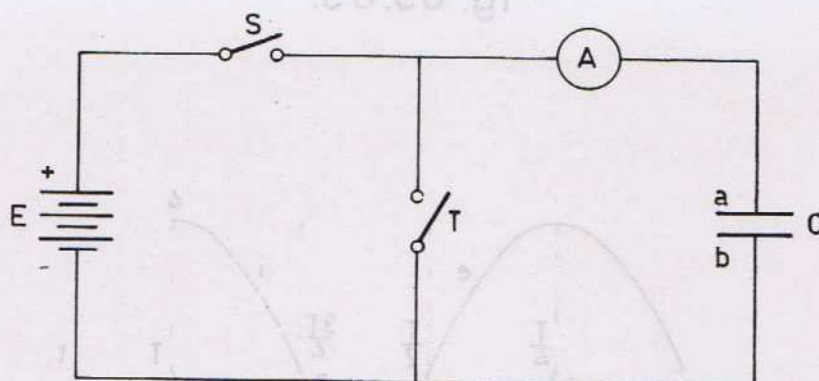


Fig. 63.03.

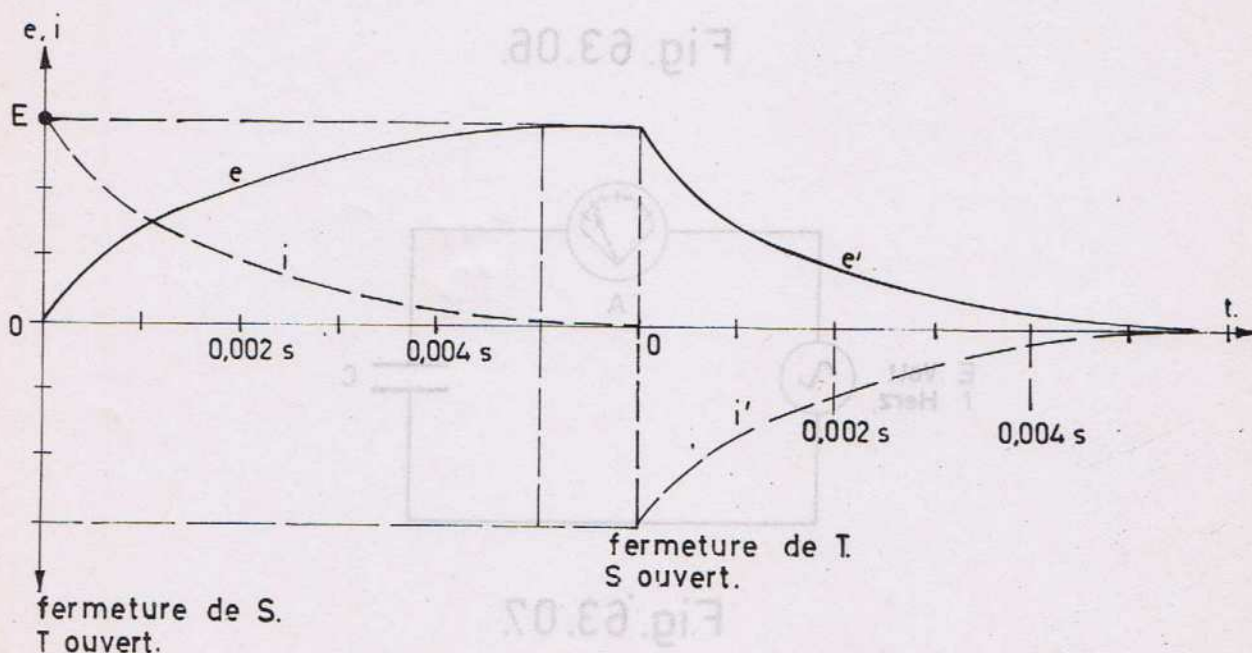


Fig. 63.04.

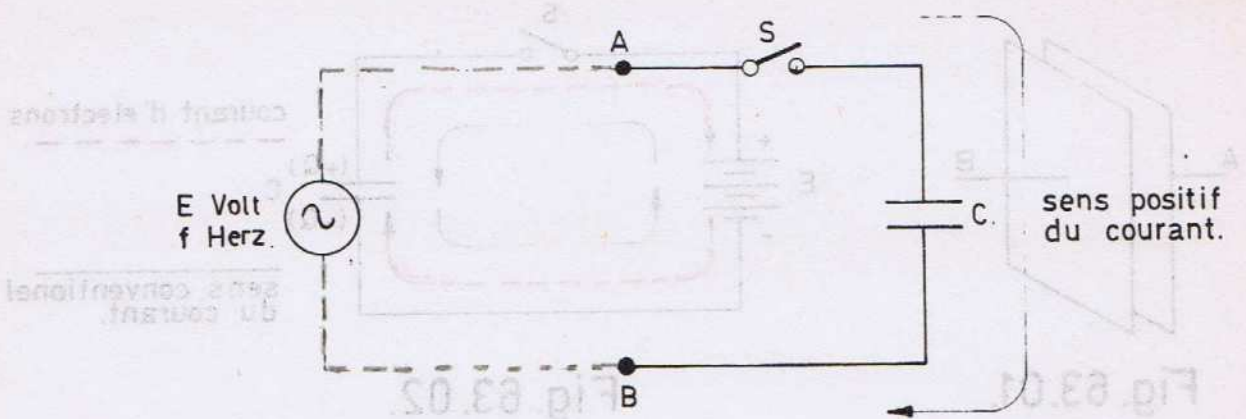


Fig. 63.05.

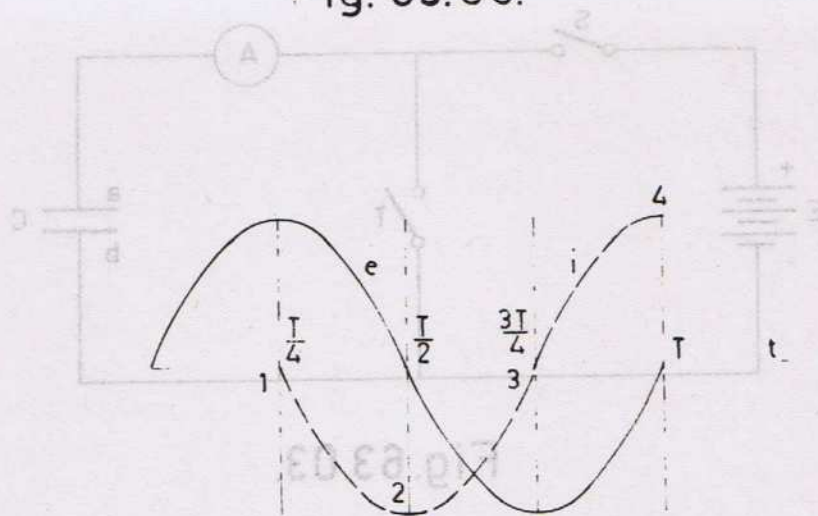


Fig. 63.06.

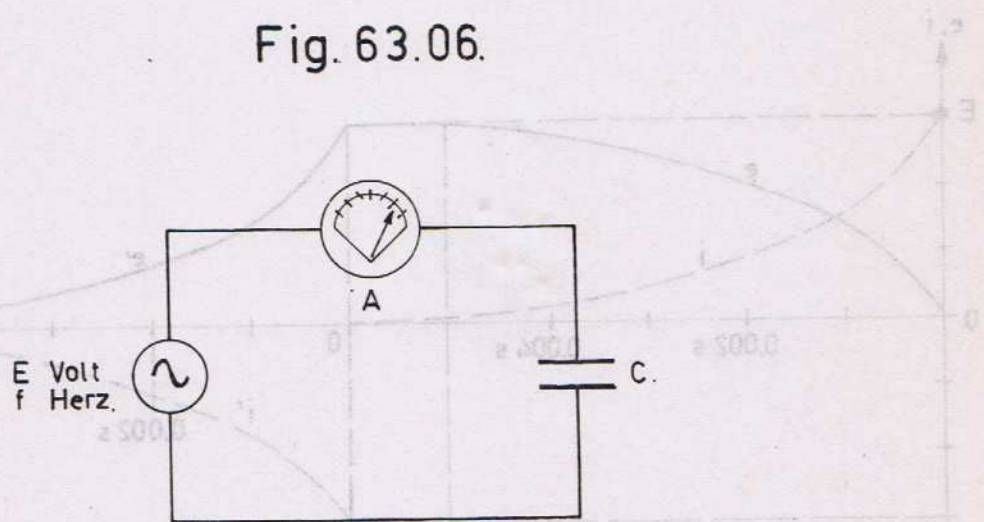


Fig. 63.07.

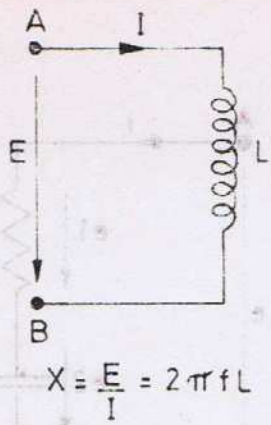


Fig. 65.01. a.

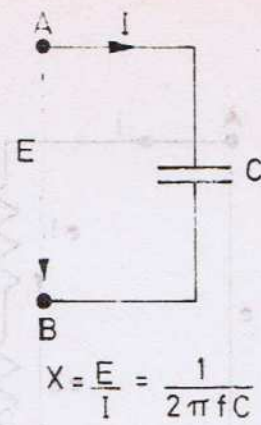


Fig. 65.01. b.

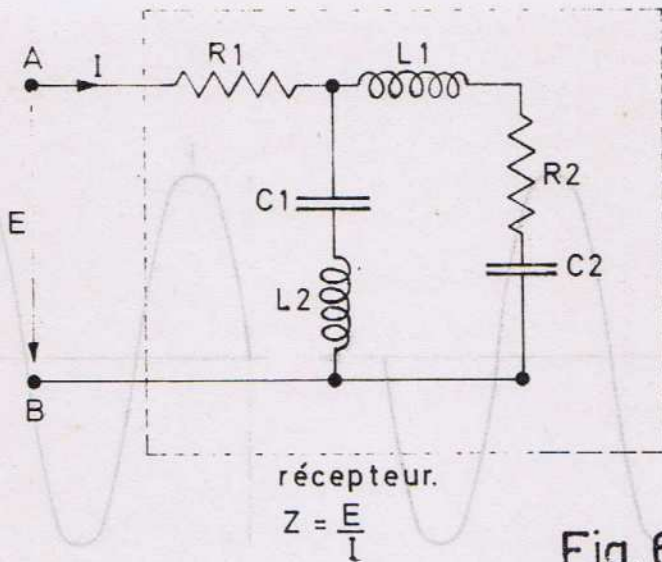


Fig. 65.01. c.

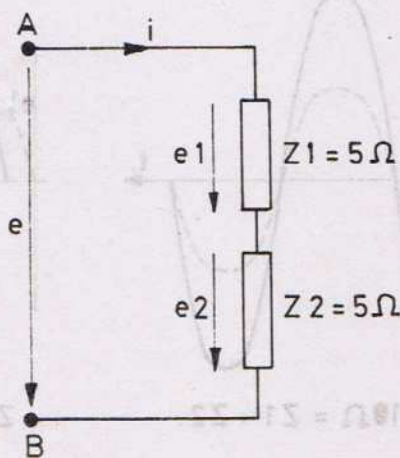
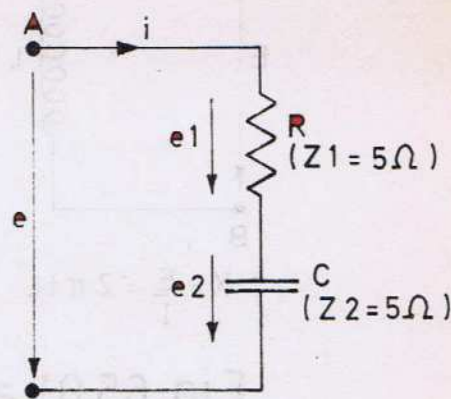
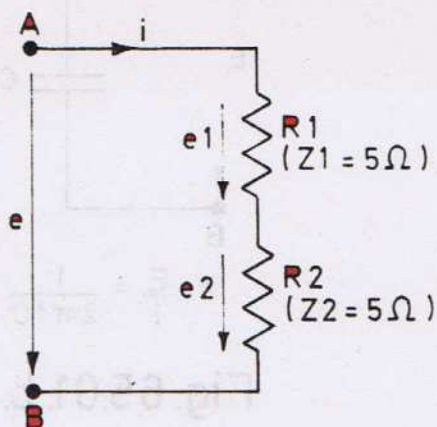
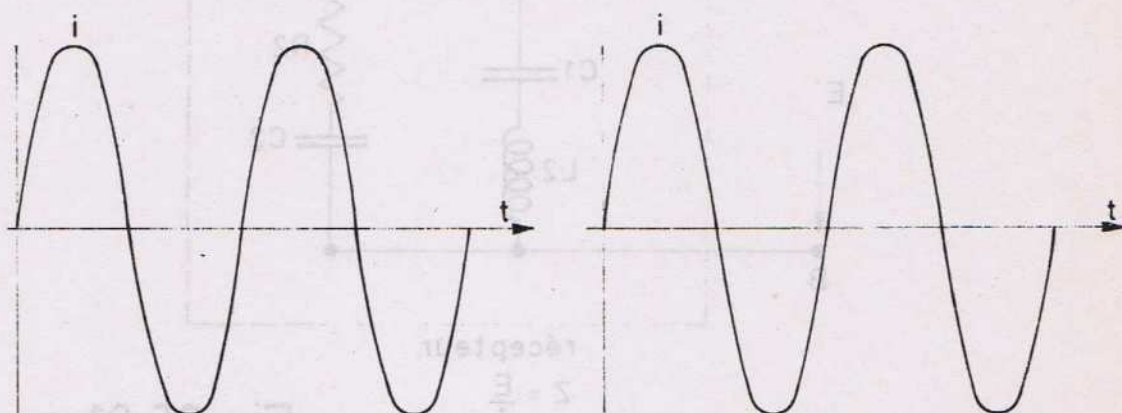


Fig. 65.02.

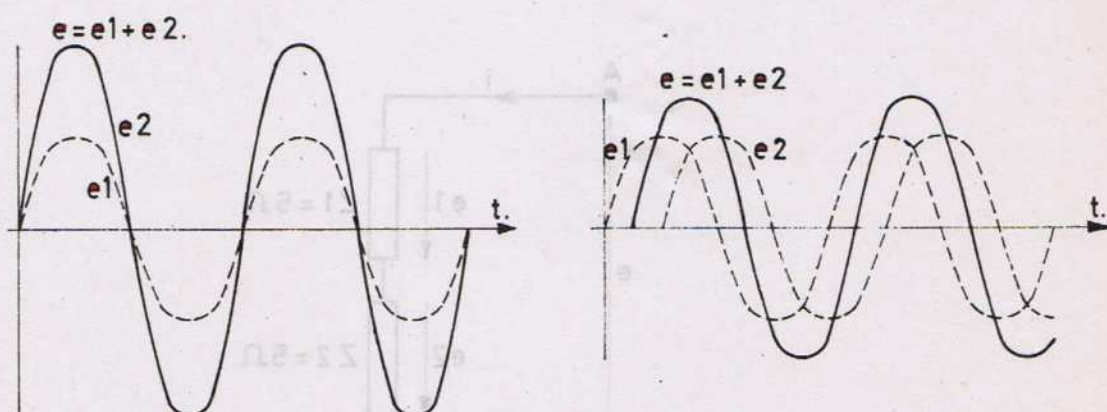
(a)



(b)



(c)

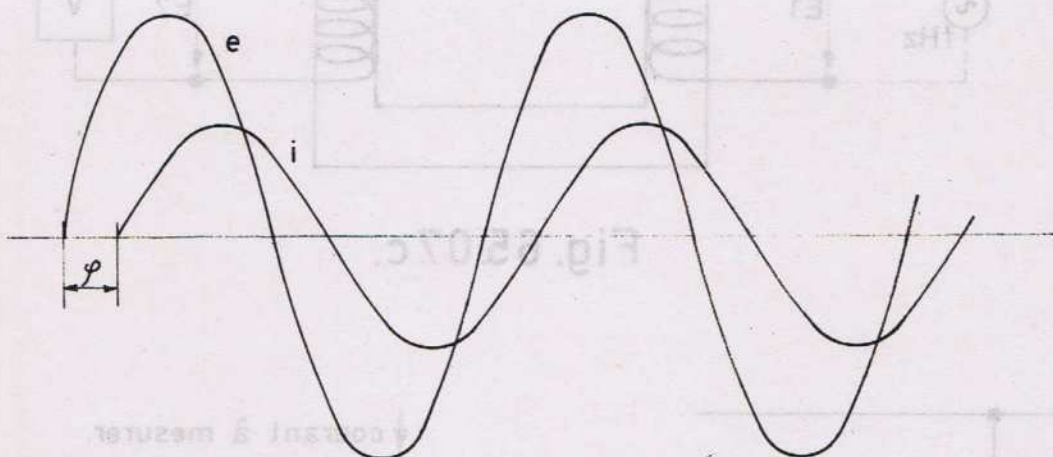
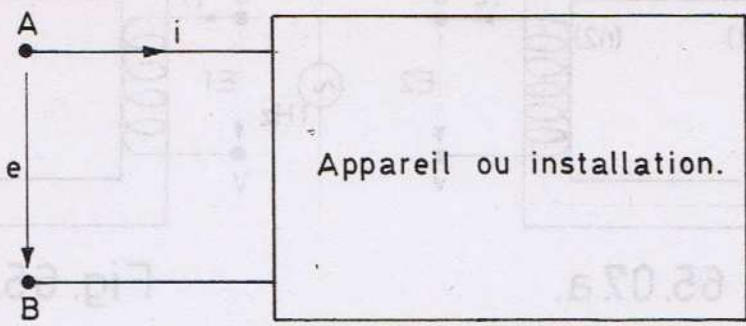


$$Z = \frac{E}{I} = \frac{10I}{I} = 10\Omega = Z_1 + Z_2.$$

$$Z = \frac{E}{I} = \frac{7,07I}{I} = 7,07\Omega \neq Z_1 + Z_2$$

Fig. 65.03.

Fig. 65.04.



$$P = E \times I \times \cos \varphi.$$

Fig. 65.05.

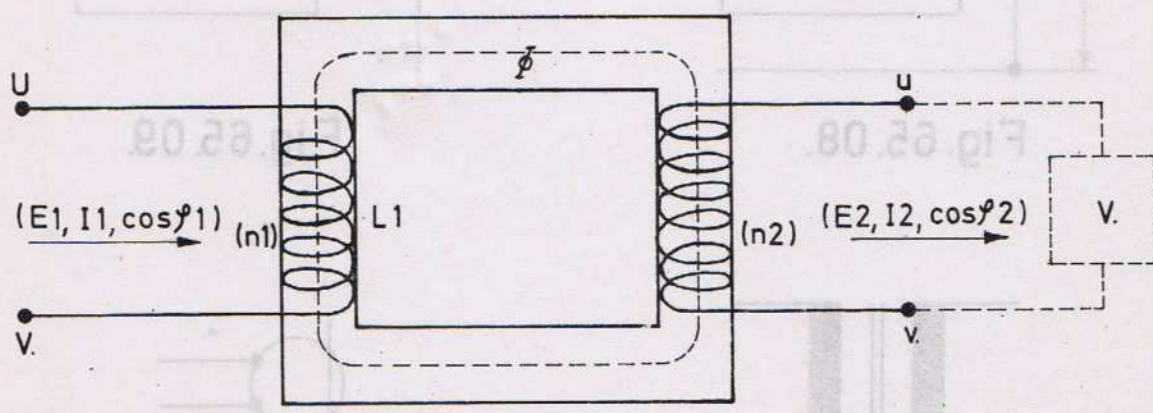


Fig. 65.06.

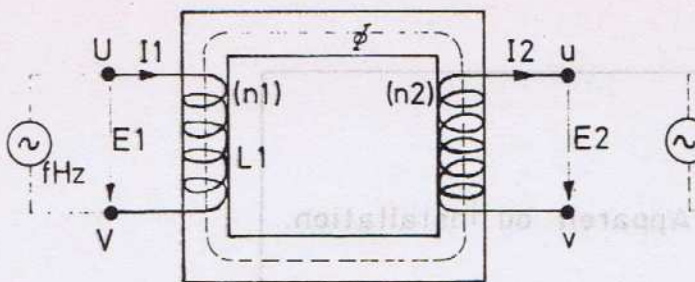


Fig. 65.07.a.

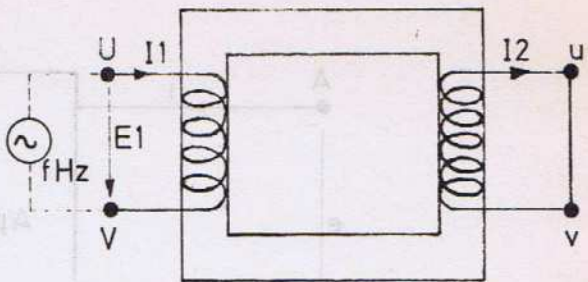


Fig. 65.07.b.

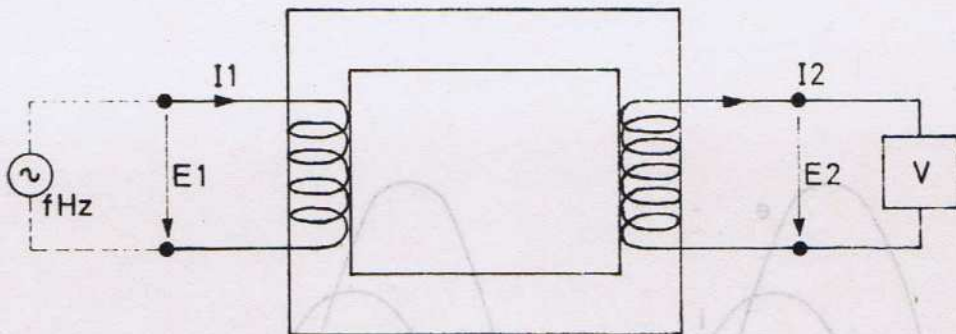


Fig. 65.07.c.

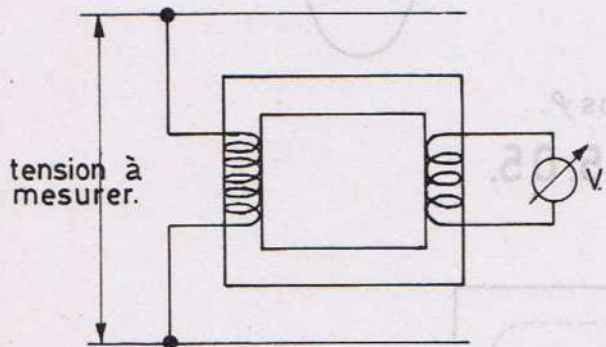


Fig. 65.08.

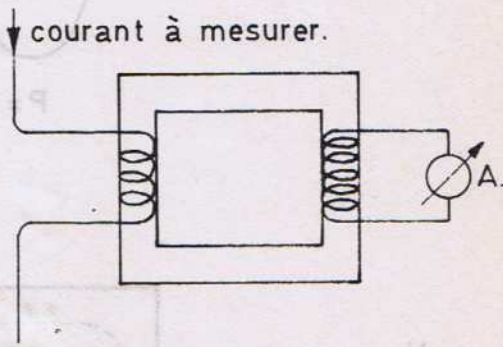
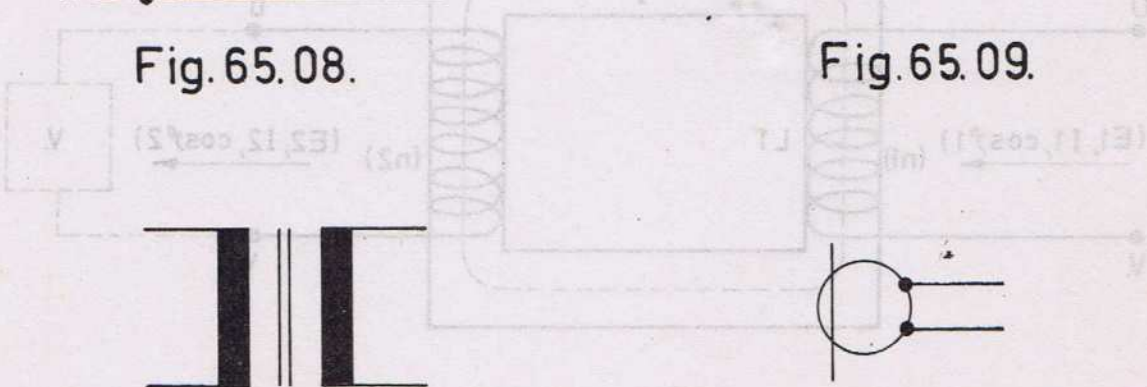


Fig. 65.09.



Transformateur de puissance.
Transformateur mesure de tension.

Transformateur mesure de courant.

Fig. 65.10.

Couche supérieure
 Semi conducteur = 4 électrons
 isolant = 8
 conducteur = 1, 2, 3, 4, 5, 6, 7, 8 MAX

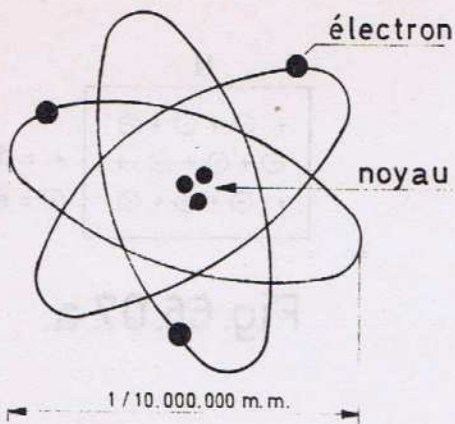


Fig. 66.01



Fig. 66.02

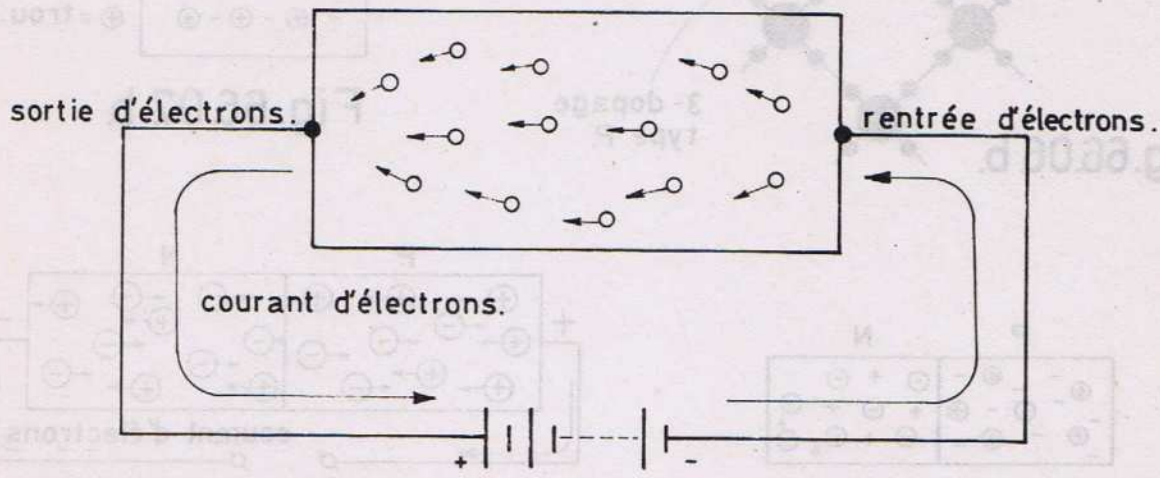


Fig. 66.03

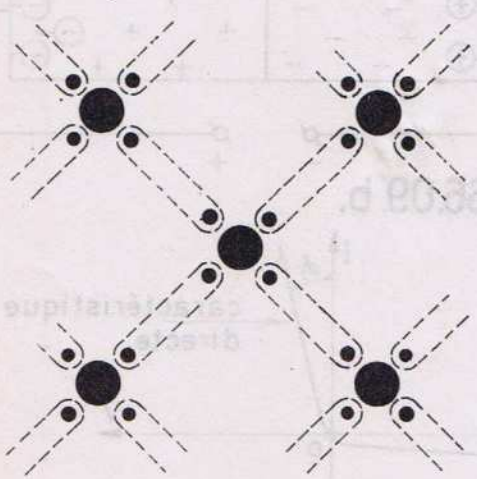


Fig. 66.04

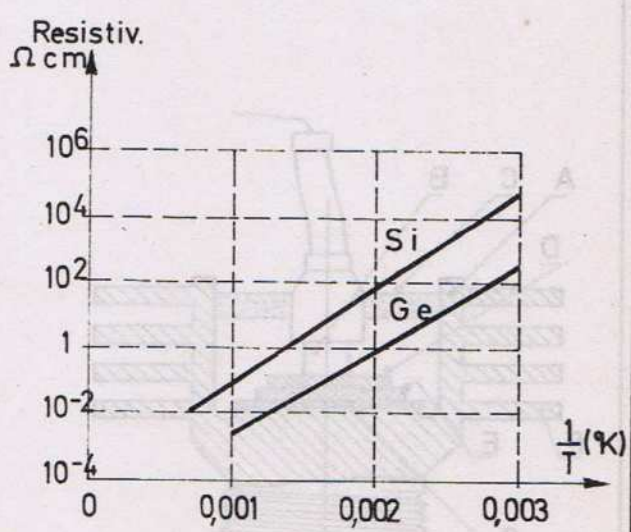


Fig. 66.05

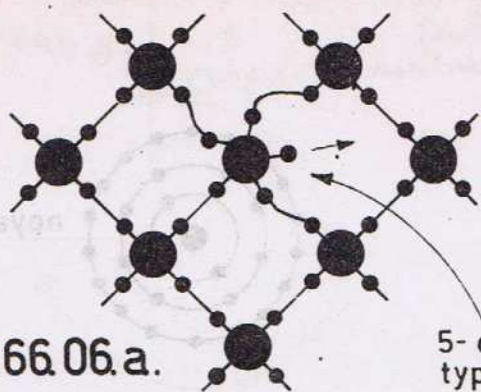


Fig. 66.06. a.

5- dopage type N.

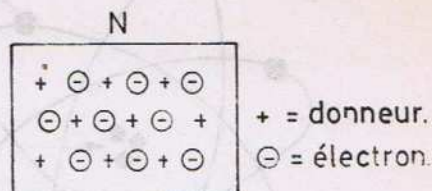


Fig. 66.07. a.

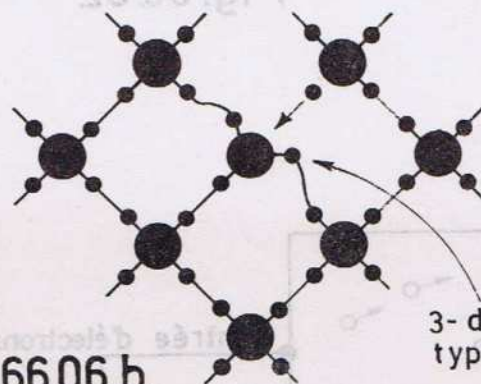


Fig. 66.06. b.

3- dopage type P.

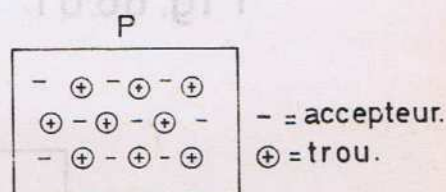


Fig. 66.07. b.

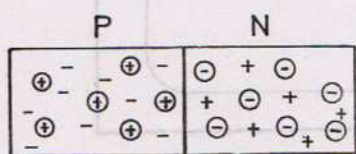


Fig. 66.08.

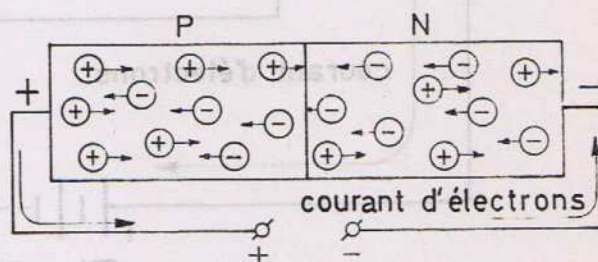


Fig. 66.09. a.

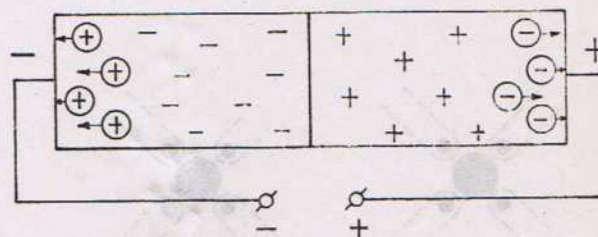


Fig. 66.09. b.

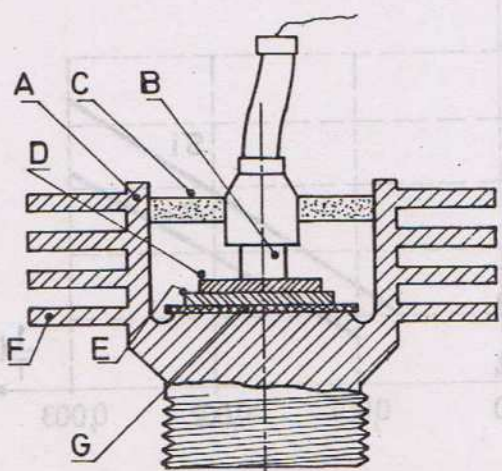


Fig. 66.11.

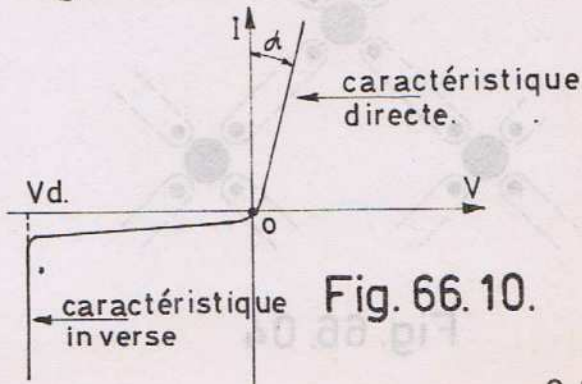


Fig. 66.10.

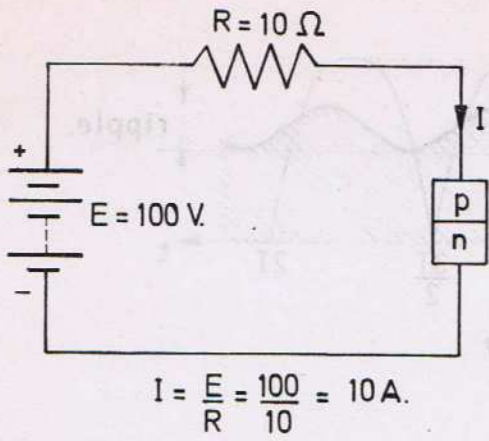


Fig. 67.01.a.

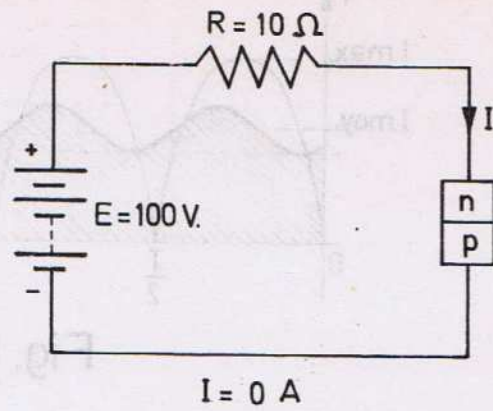


Fig. 67.01.b.

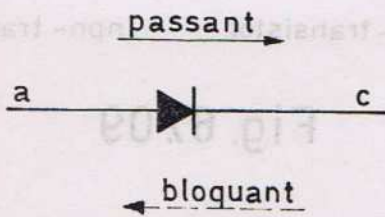


Fig. 67.02.

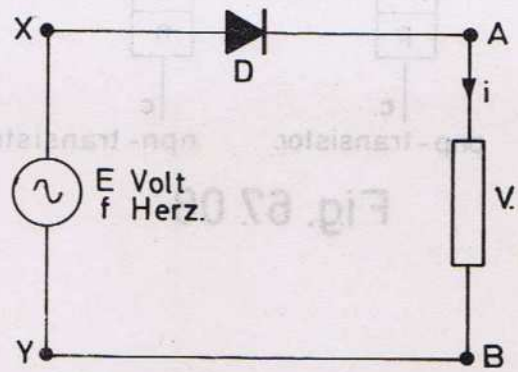


Fig. 67.03.

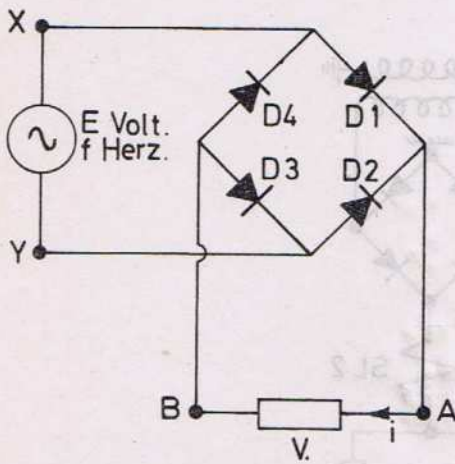


Fig. 67.06.

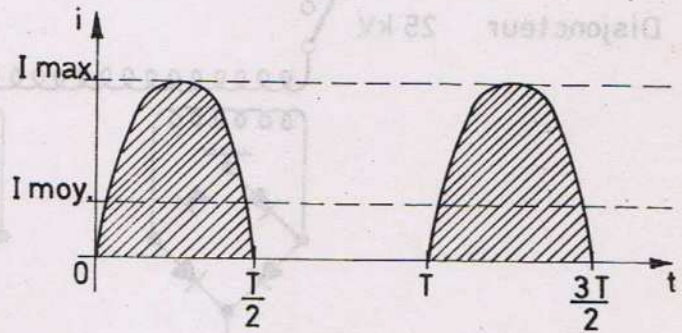


Fig. 67.04.

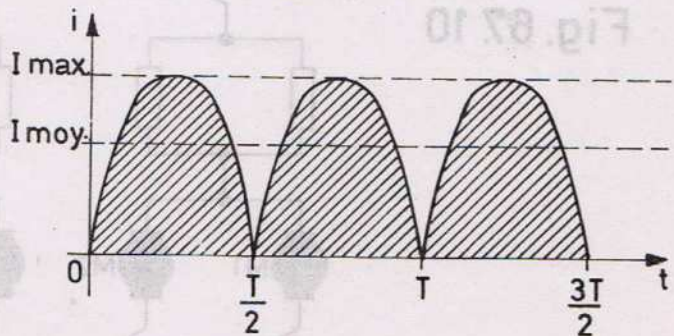


Fig. 67.05.

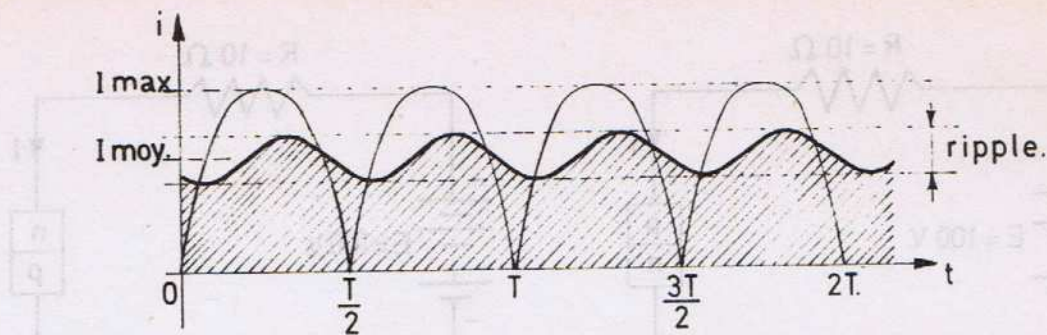


Fig. 67.07

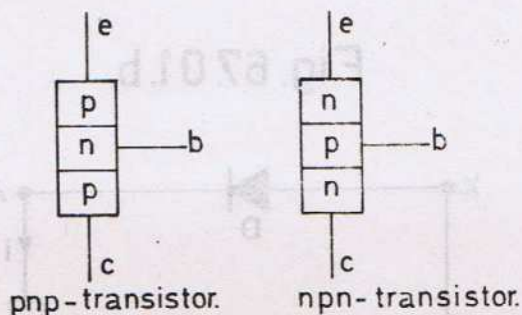


Fig. 67.08

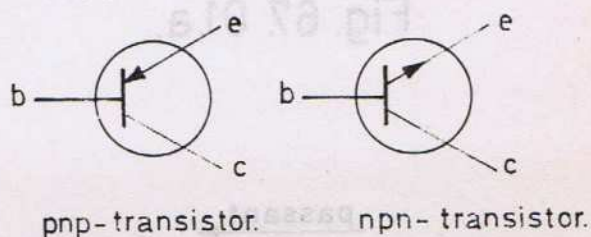


Fig. 67.09

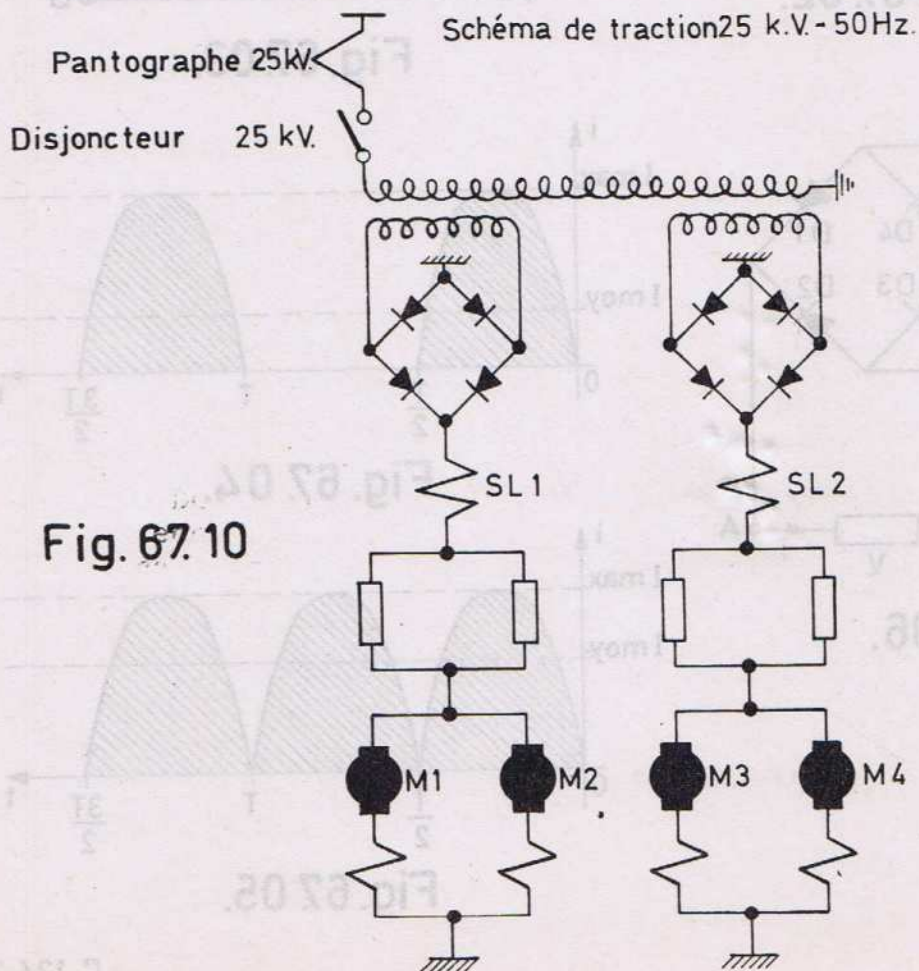


Fig. 67.10

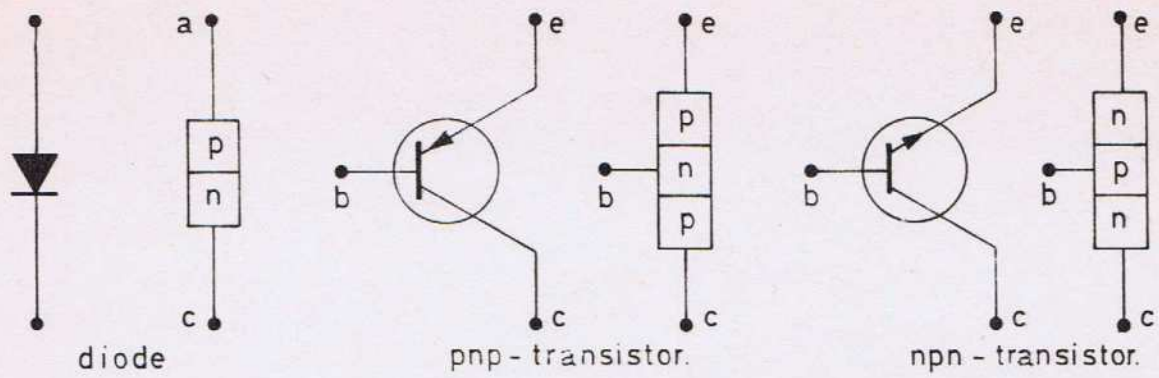
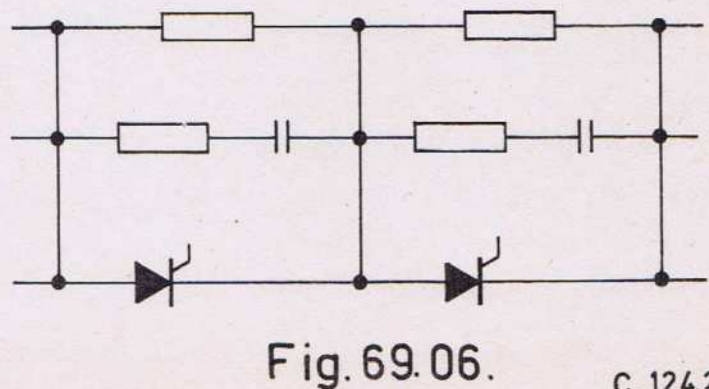
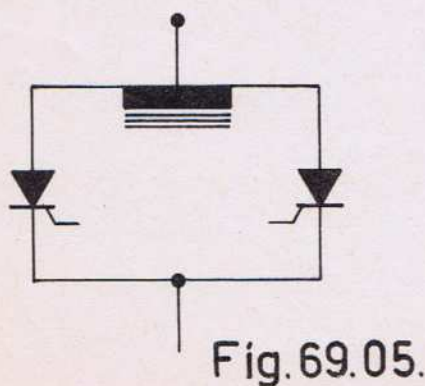
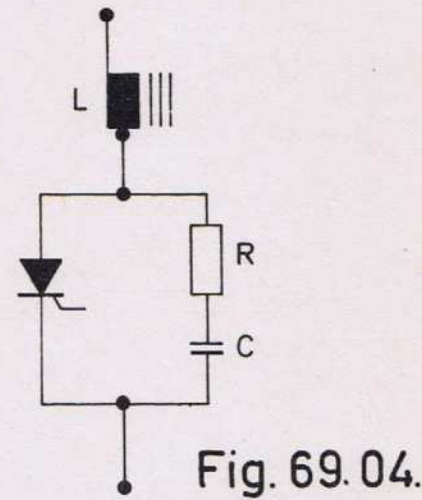
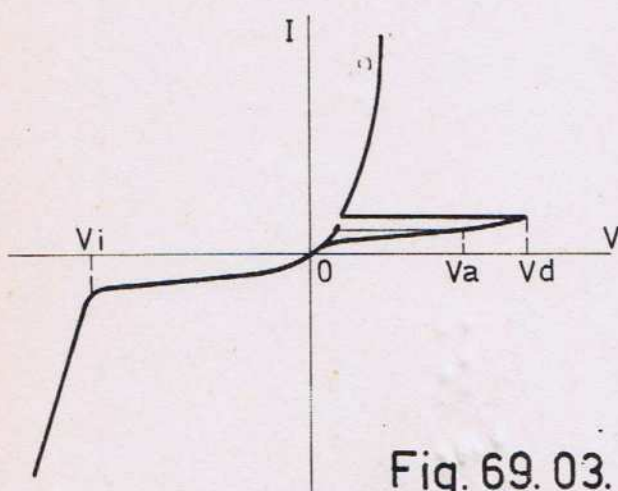
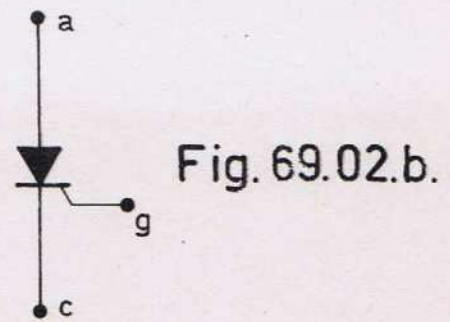
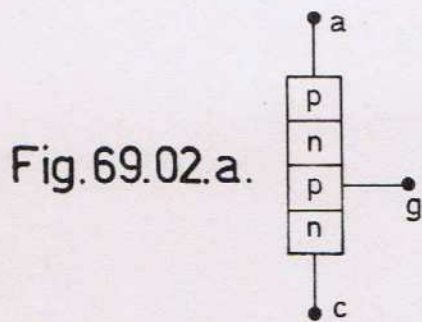


Fig. 69.01.



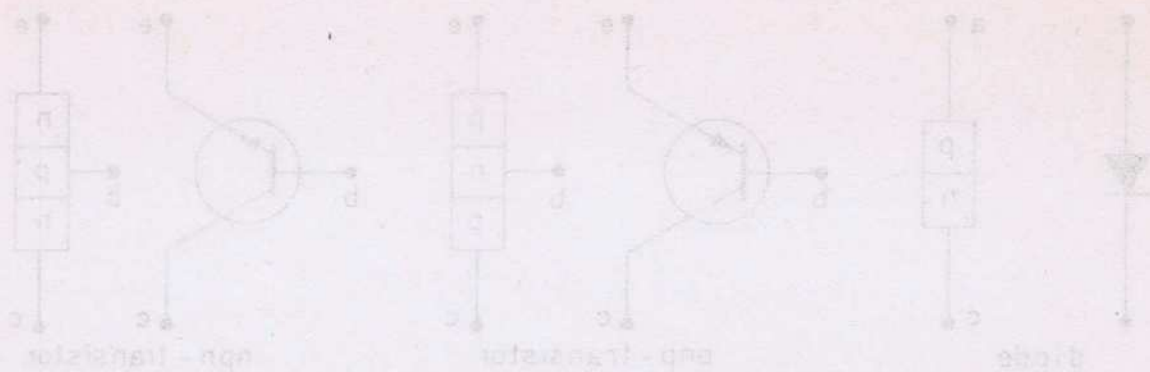


Fig. 89.01

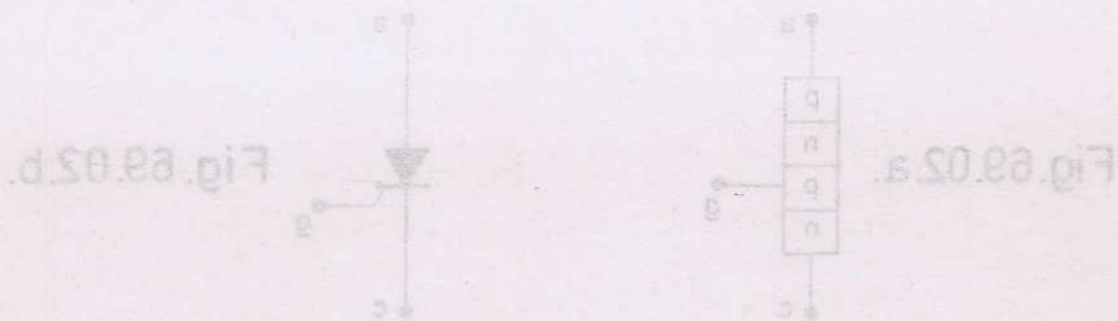


Fig. 89.02 a.

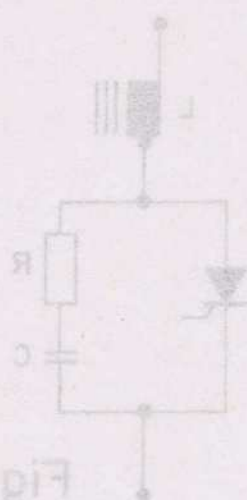


Fig. 89.03

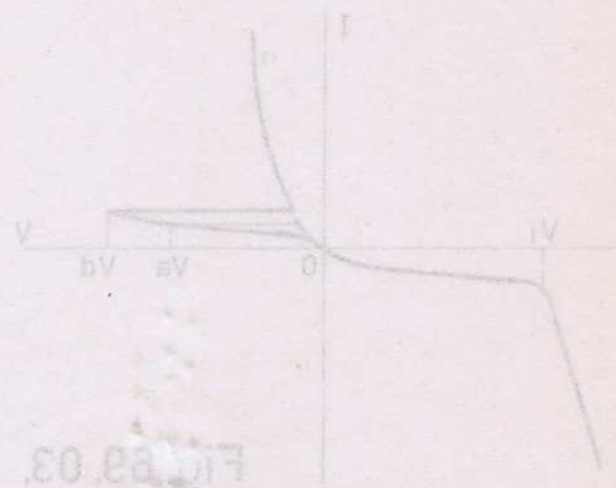


Fig. 89.04

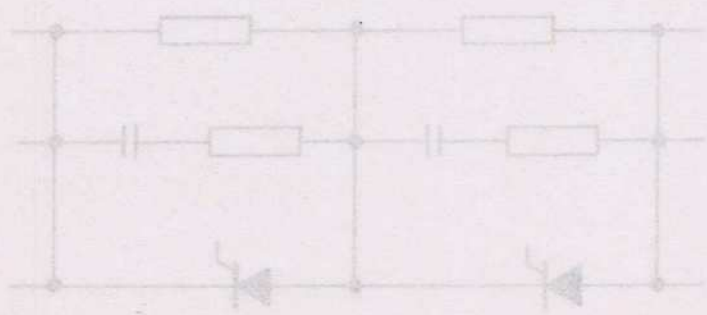


Fig. 89.05

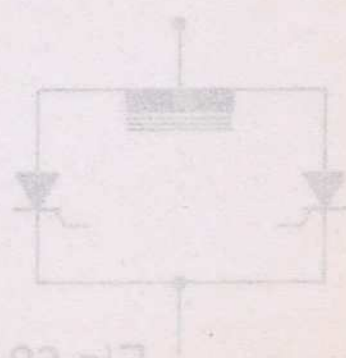


Fig. 89.06

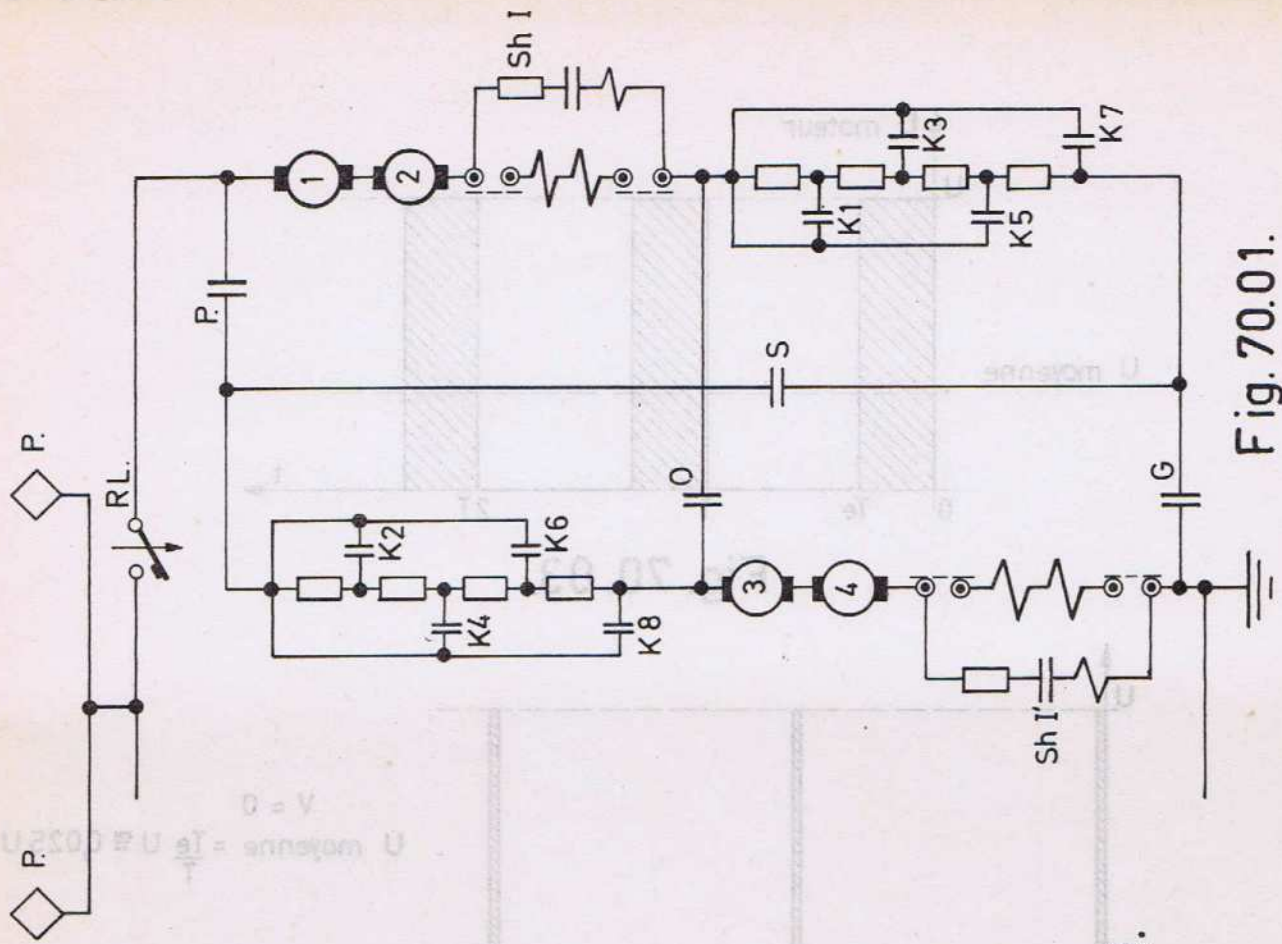


Fig. 70.01.

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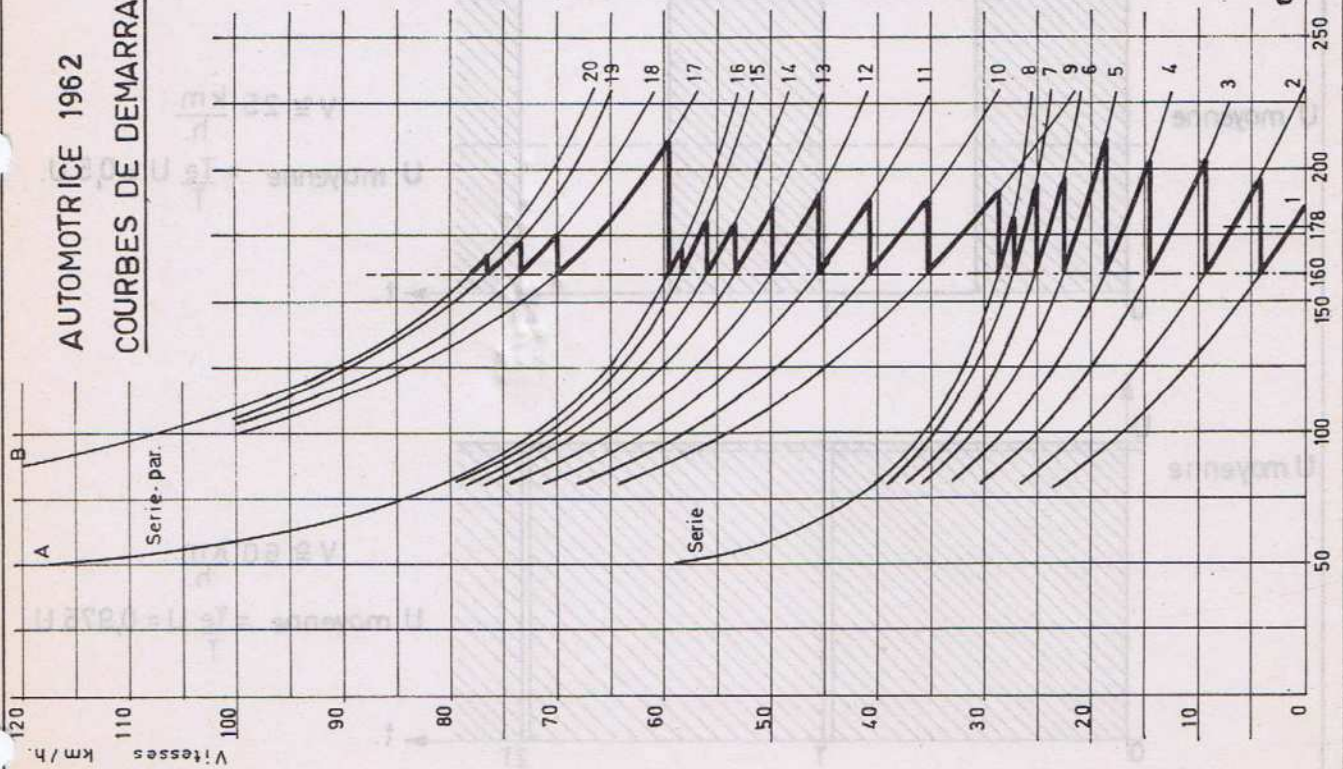


Fig. 70.02.

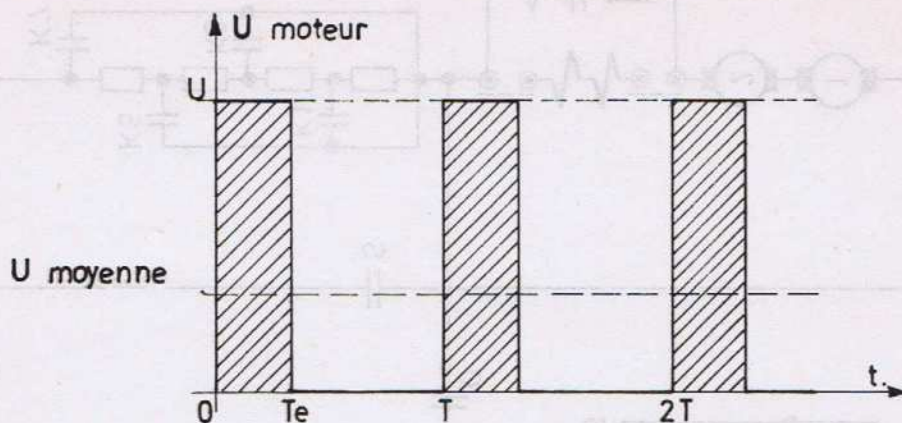
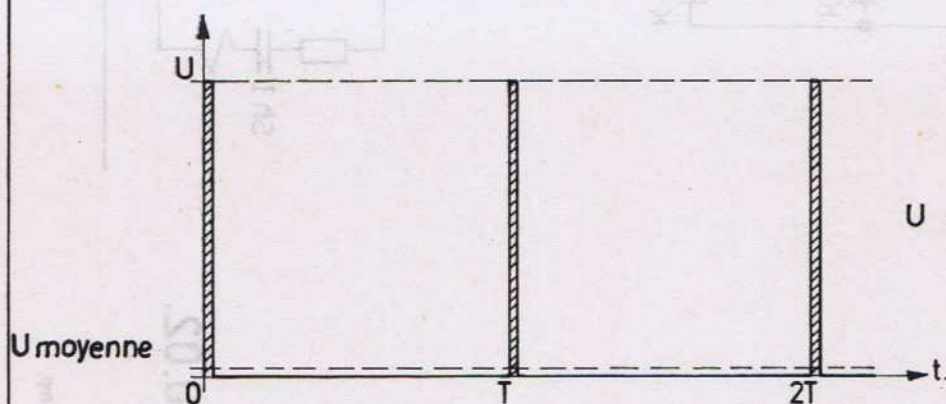
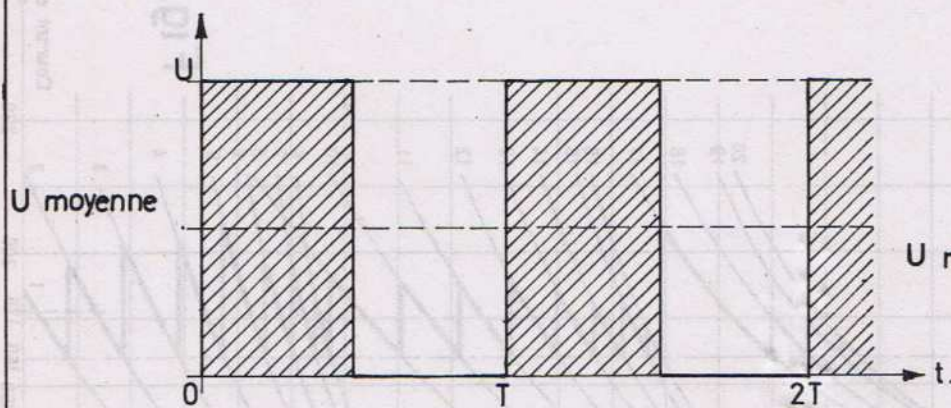


Fig. 70.03.



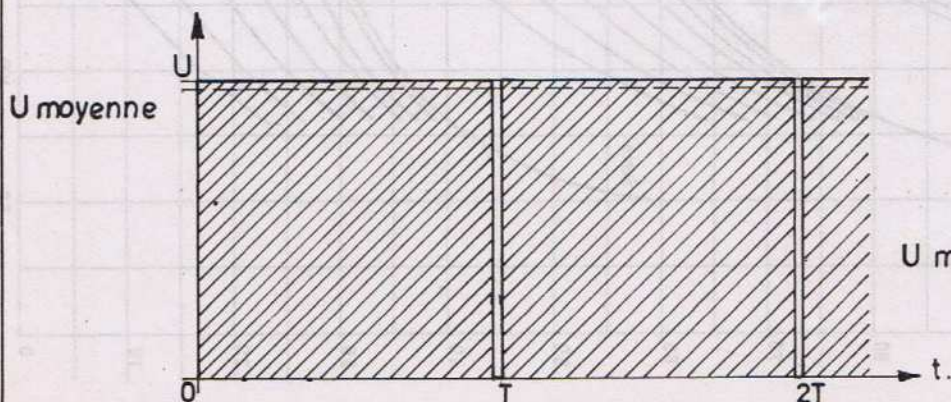
$$V = 0$$

$$U_{\text{moyenne}} = \frac{T_e}{T} U \approx 0,025 U.$$



$$V \approx 25 \frac{\text{km.}}{\text{h.}}$$

$$U_{\text{moyenne}} = \frac{T_e}{T} U = 0,5 U.$$



$$V \approx 60 \frac{\text{km.}}{\text{h.}}$$

$$U_{\text{moyenne}} = \frac{T_e}{T} U = 0,975 U.$$

Fig. 70.04.

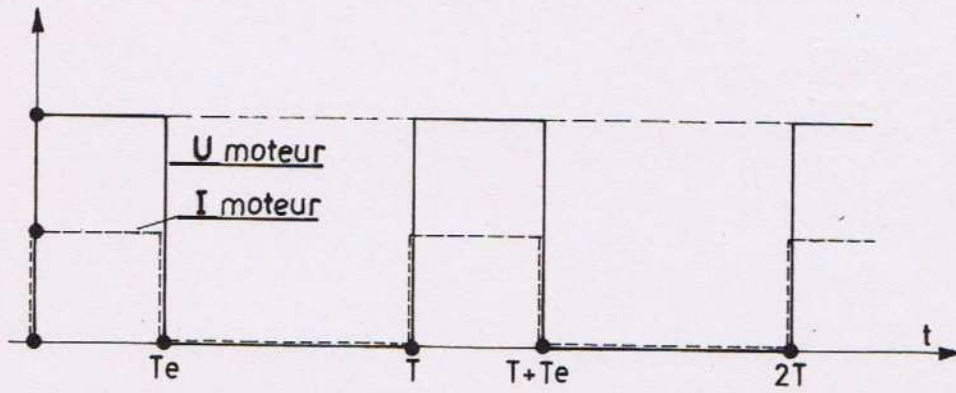


Fig. 70.05.

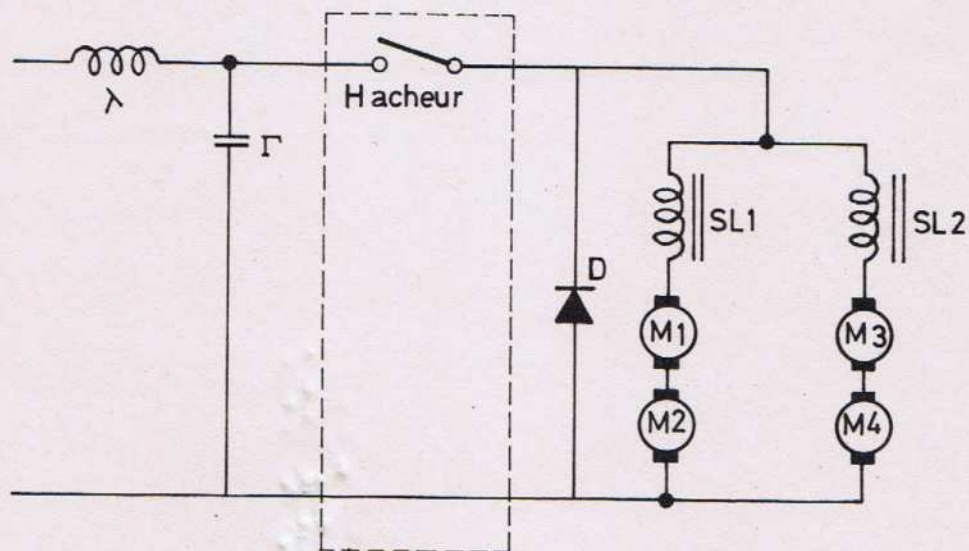


Fig. 70.06.

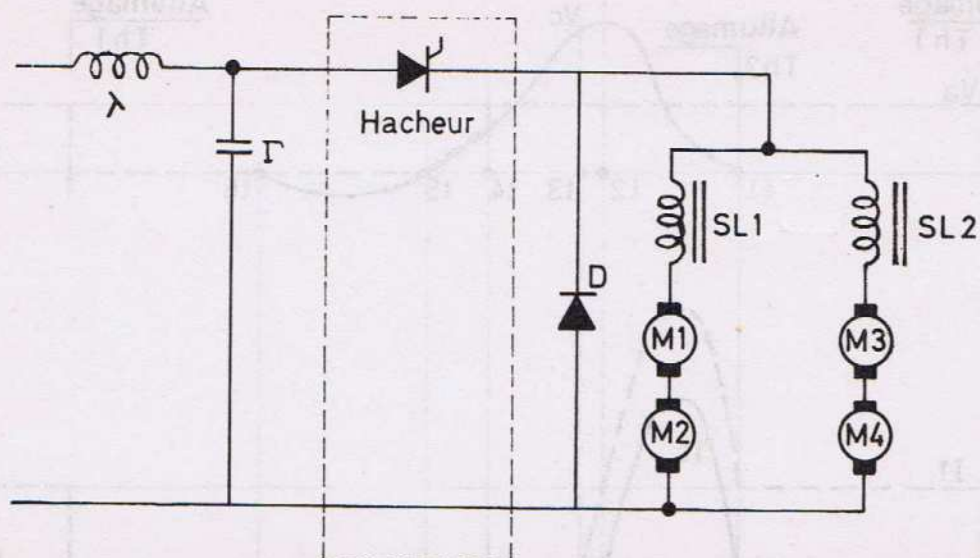


Fig. 71.01.

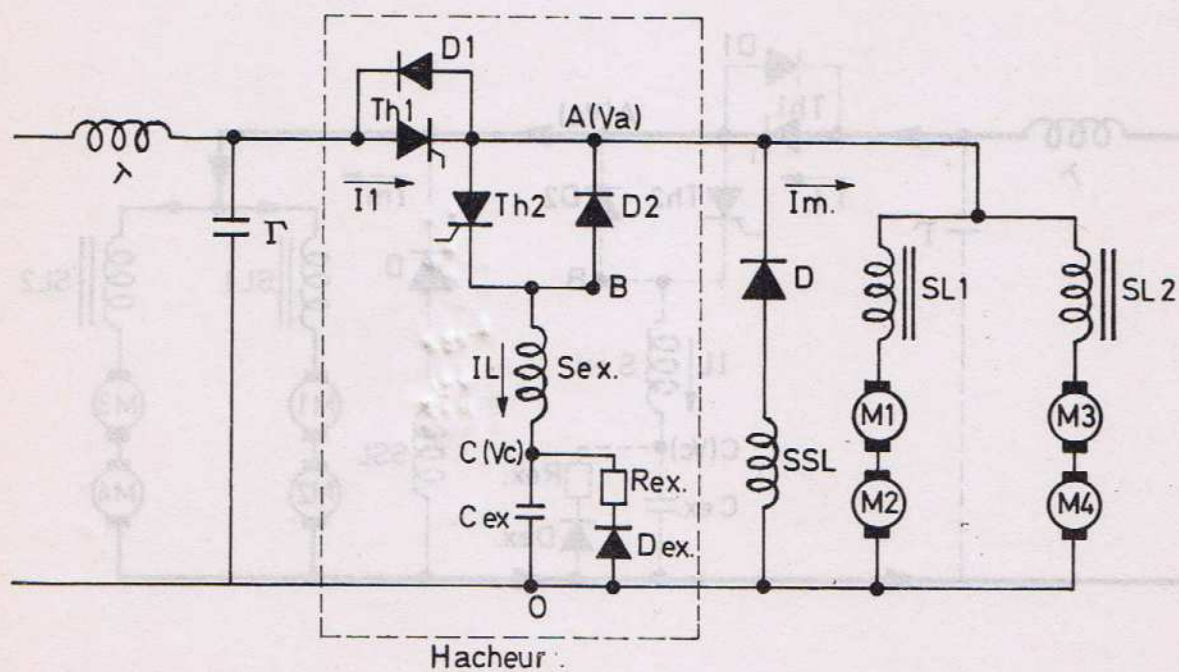


Fig. 71.02.

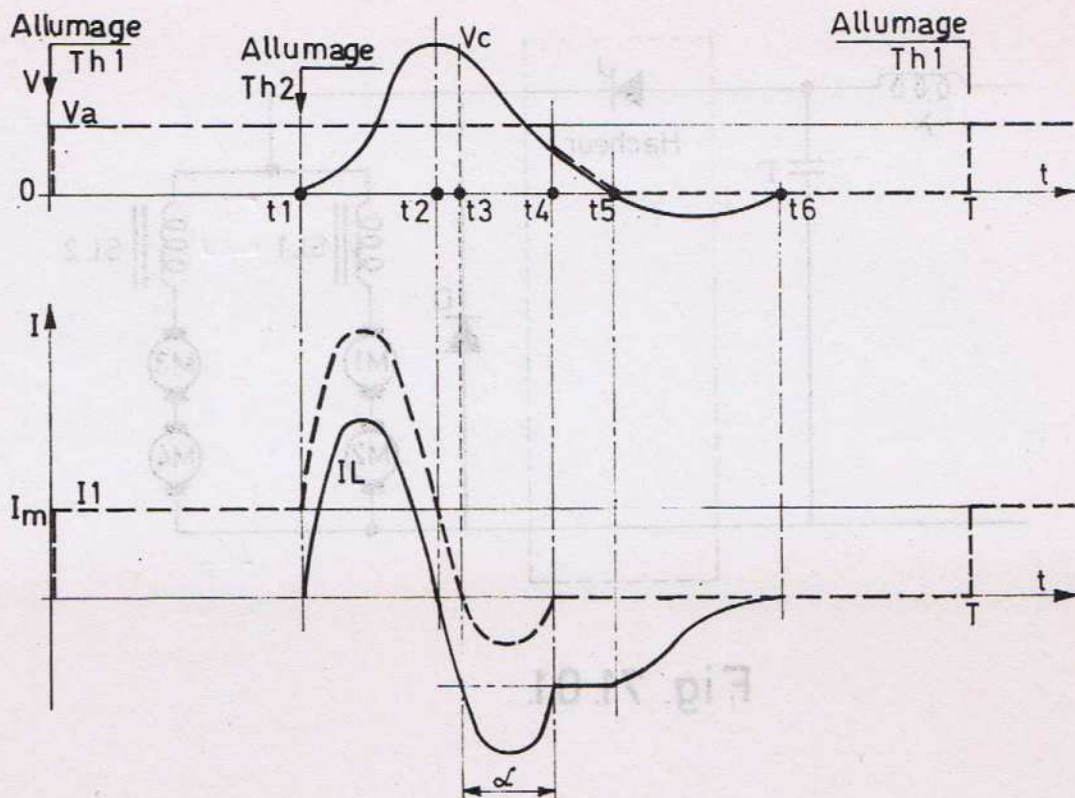


Fig. 71.03

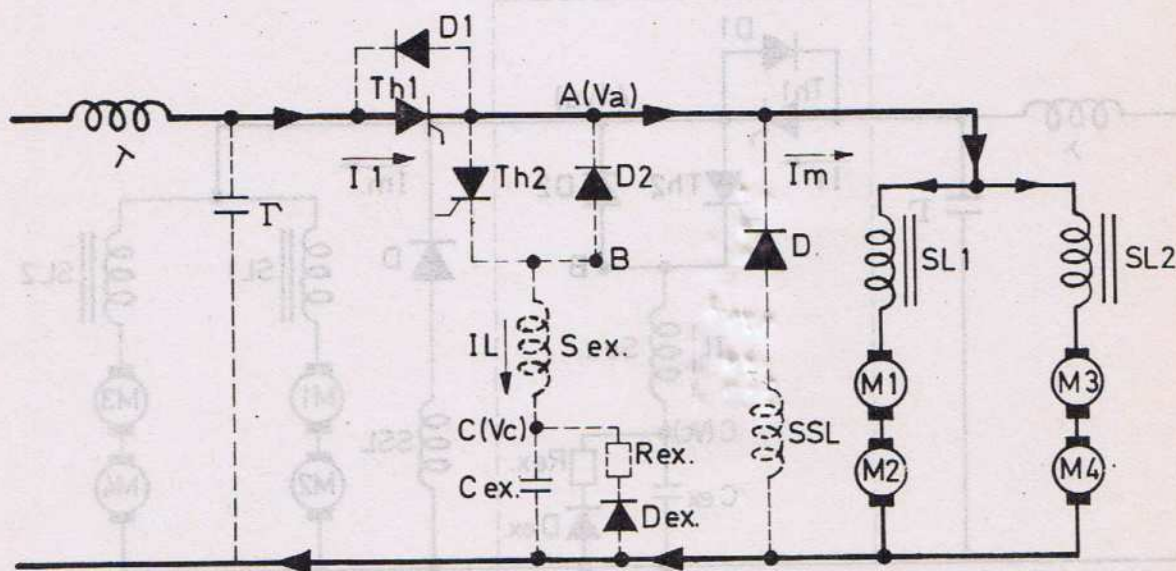


Fig. 71.04.a.

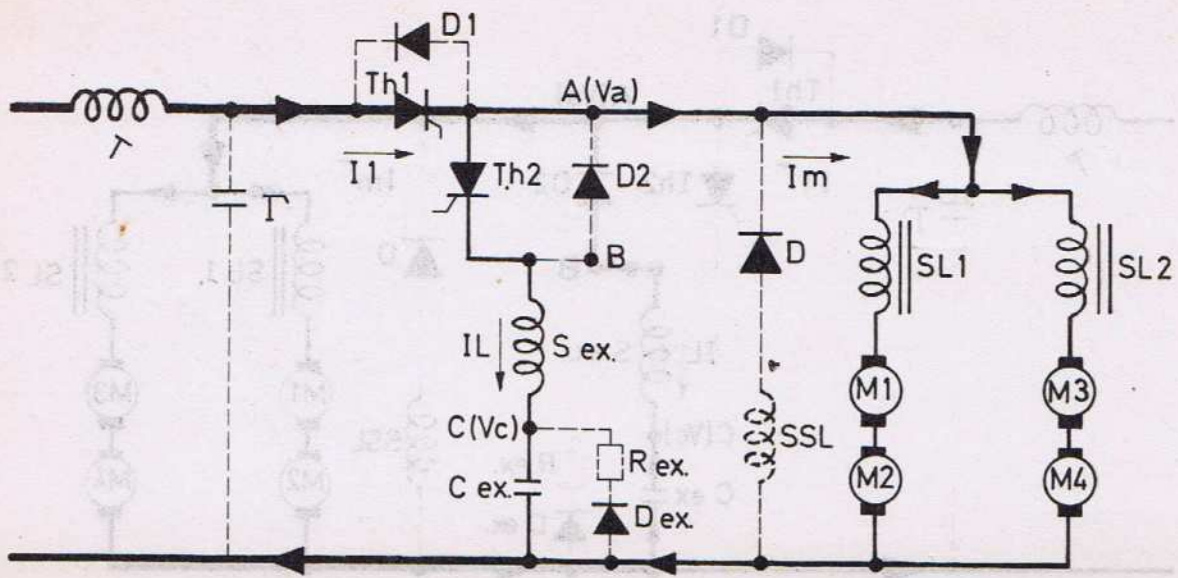


Fig. 71.04.b.

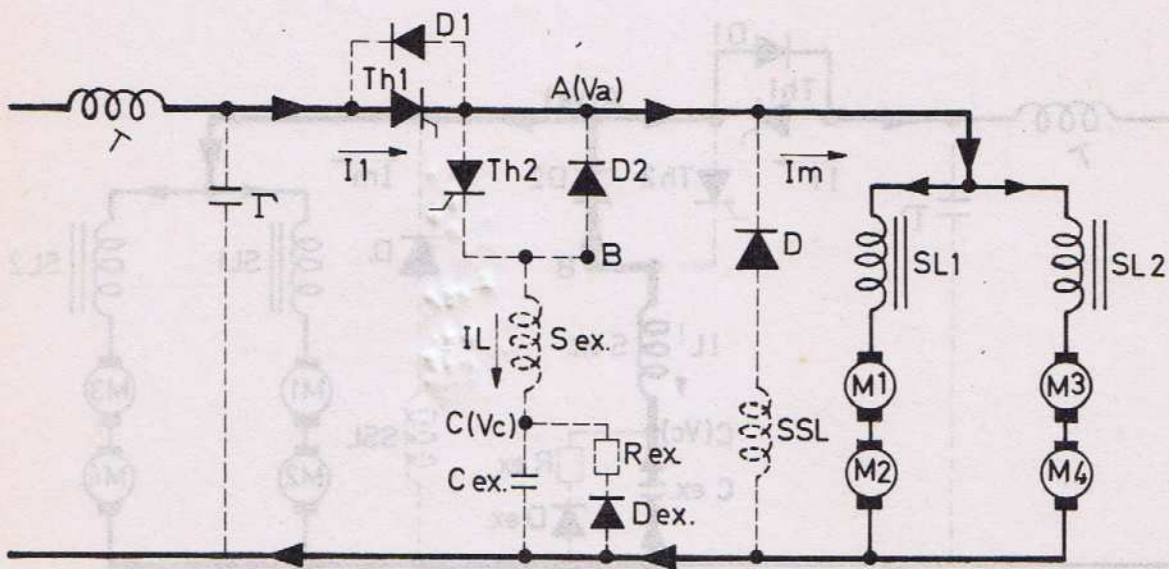


Fig. 71.04.c.

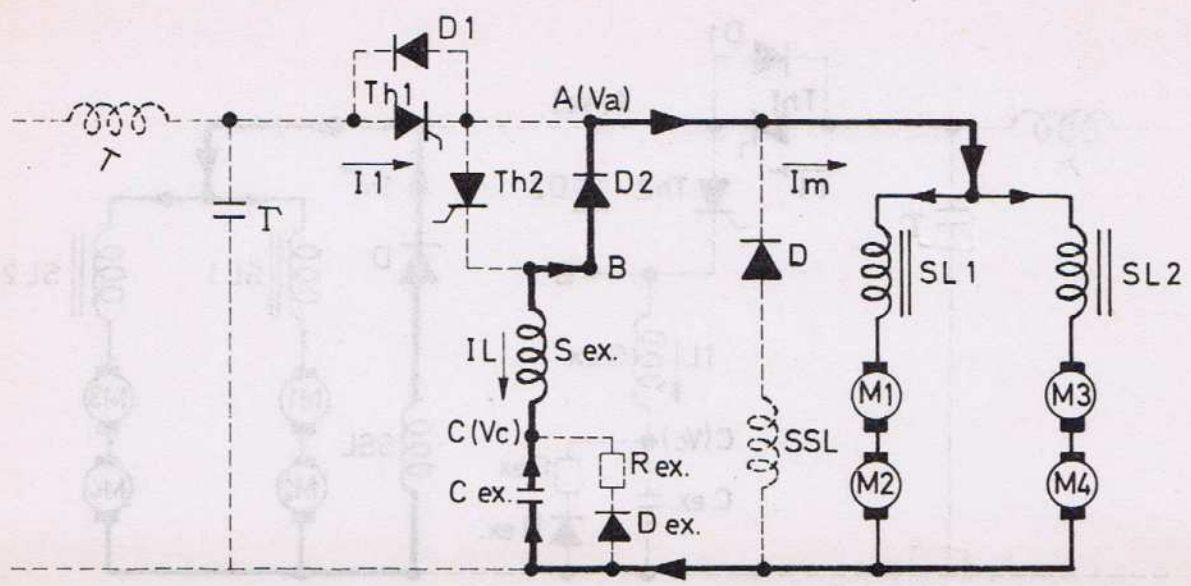


Fig. 71.04.f.

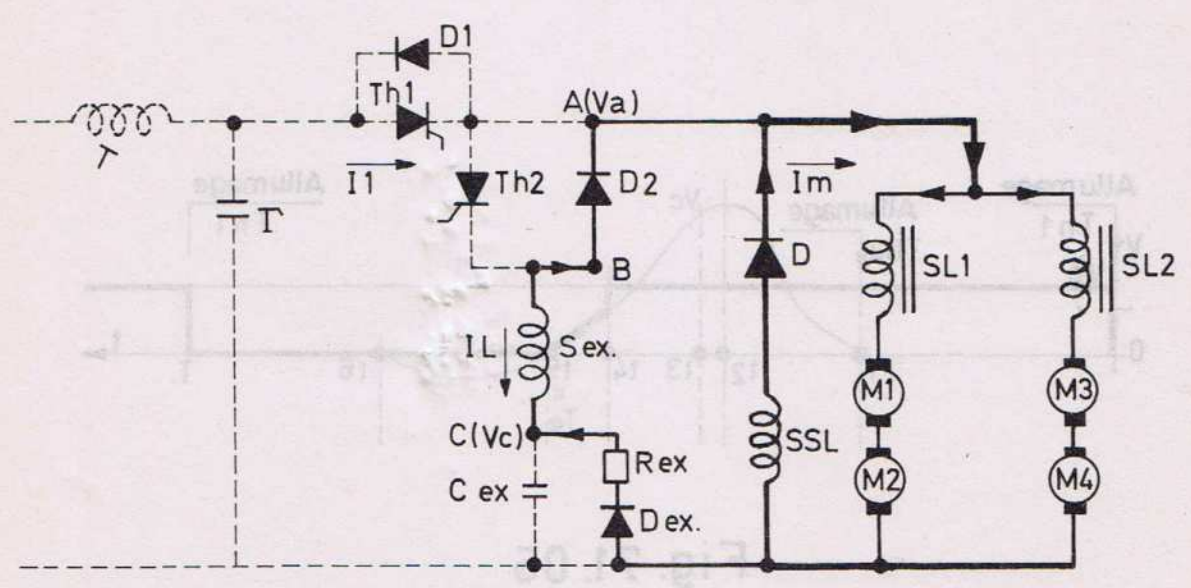


Fig. 71.04.g.

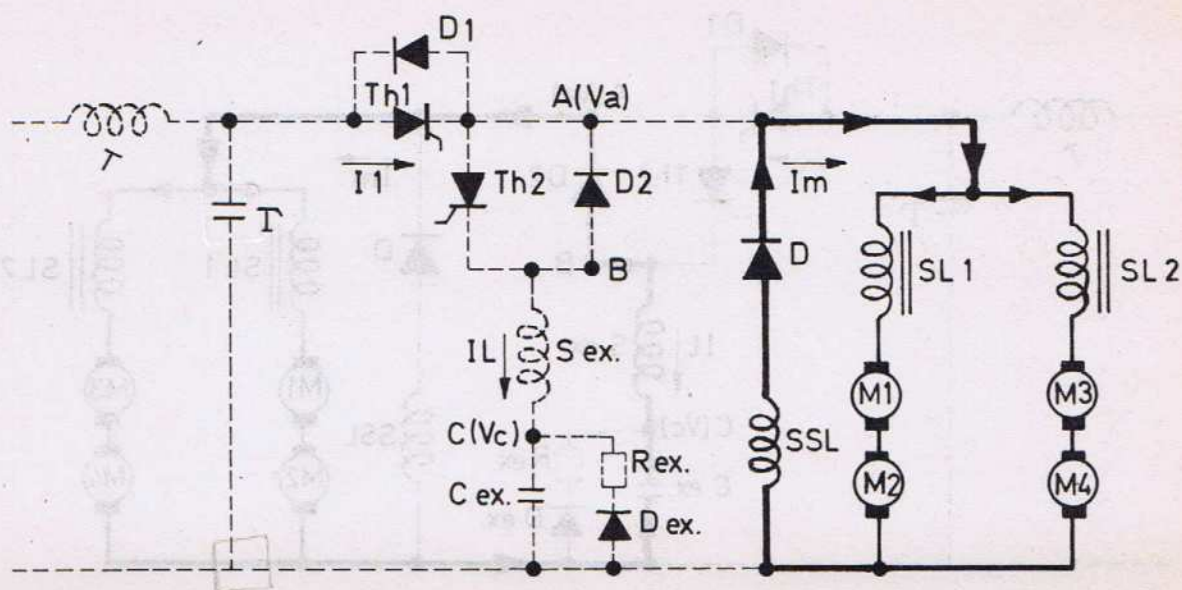


Fig. 71.04.h.

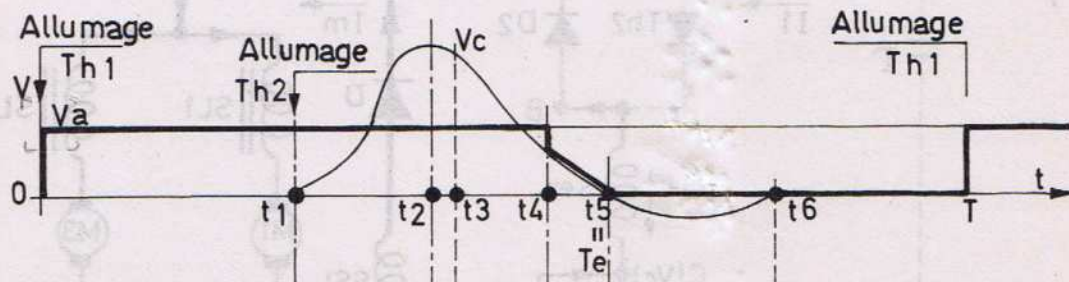


Fig. 71.05

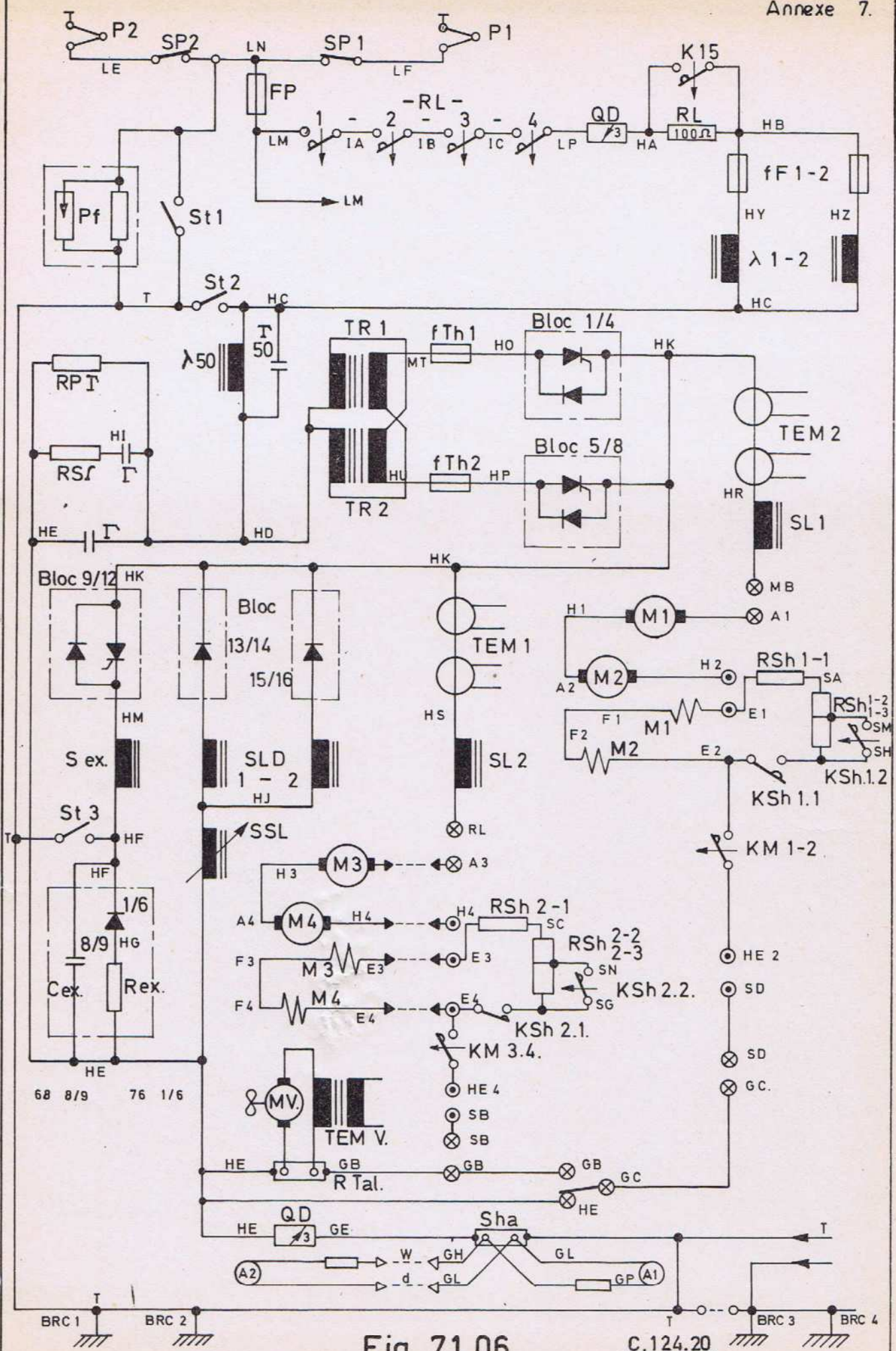


Fig. 71.06.

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