

DIRECTION M

BUREAU 22-01

SECTION 2

TRACTION DIESEL

COURS POUR ELEVES-CONDUCTEURS

Livre II

Le moteur diesel et la transmission hydraulique

Leçons 49 à 96

PLANCHES



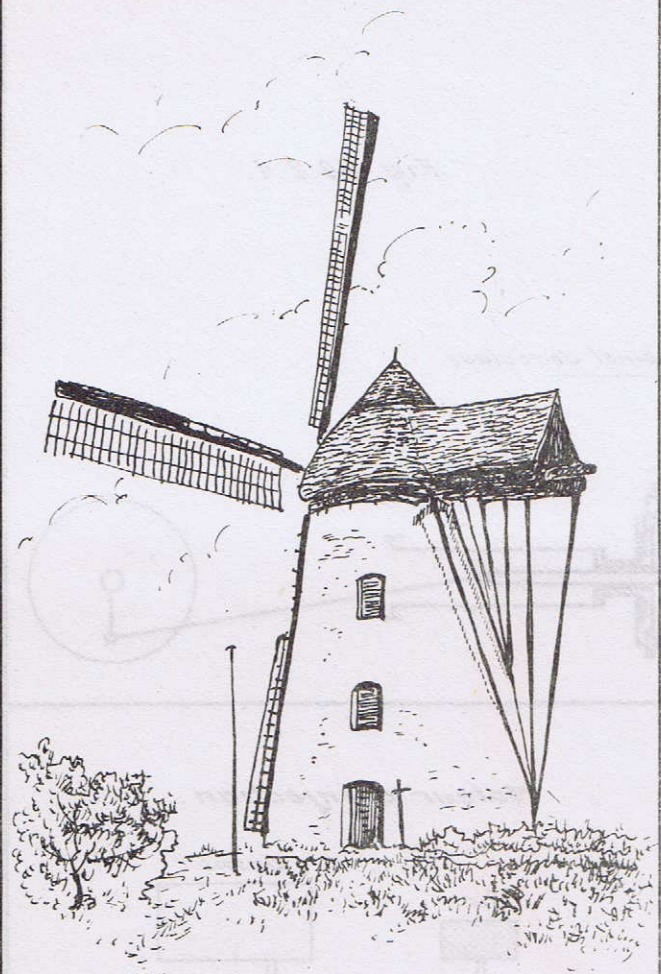
PB. Post 1000000

R Replage

R 1	4PB
R 3	5PB
R 4	1PB
R 2	3PB

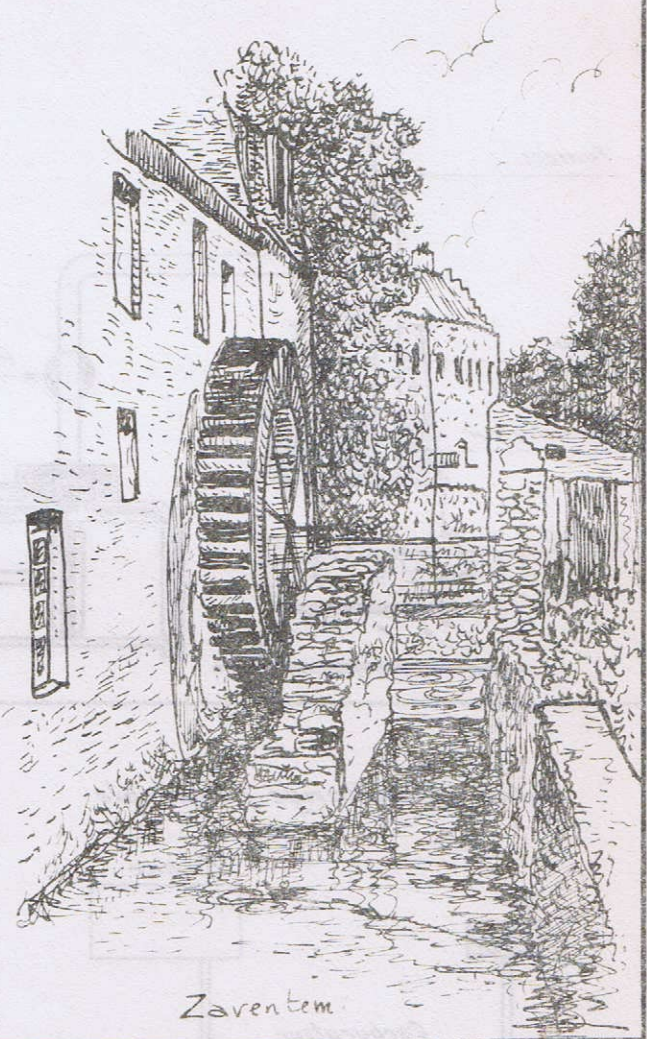
R 1	4PB
R 2	3PB
R 4	1PB
R 3	2PB

Fig. 49.0.1.



Saintes.

Fig. 49.0.2.



Zaventem.

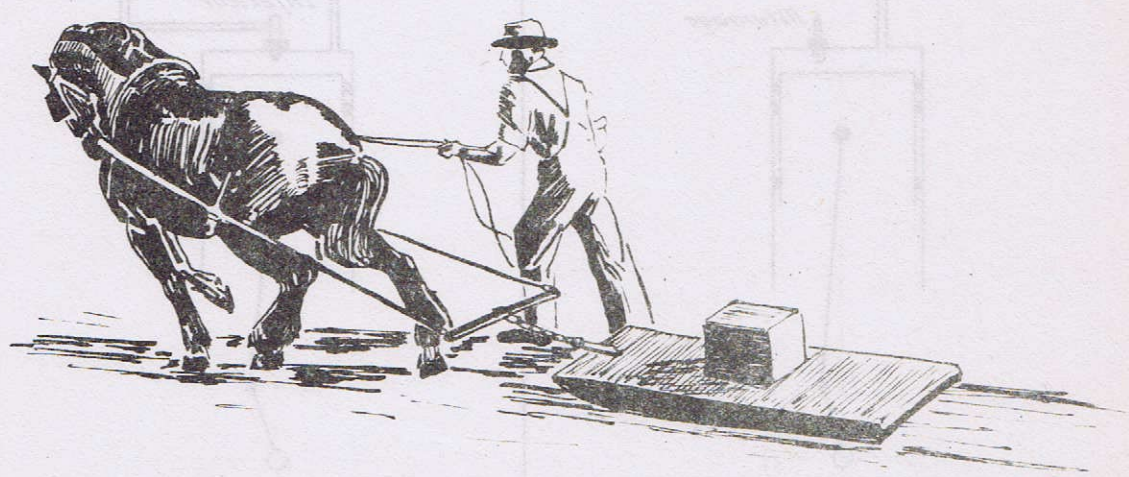
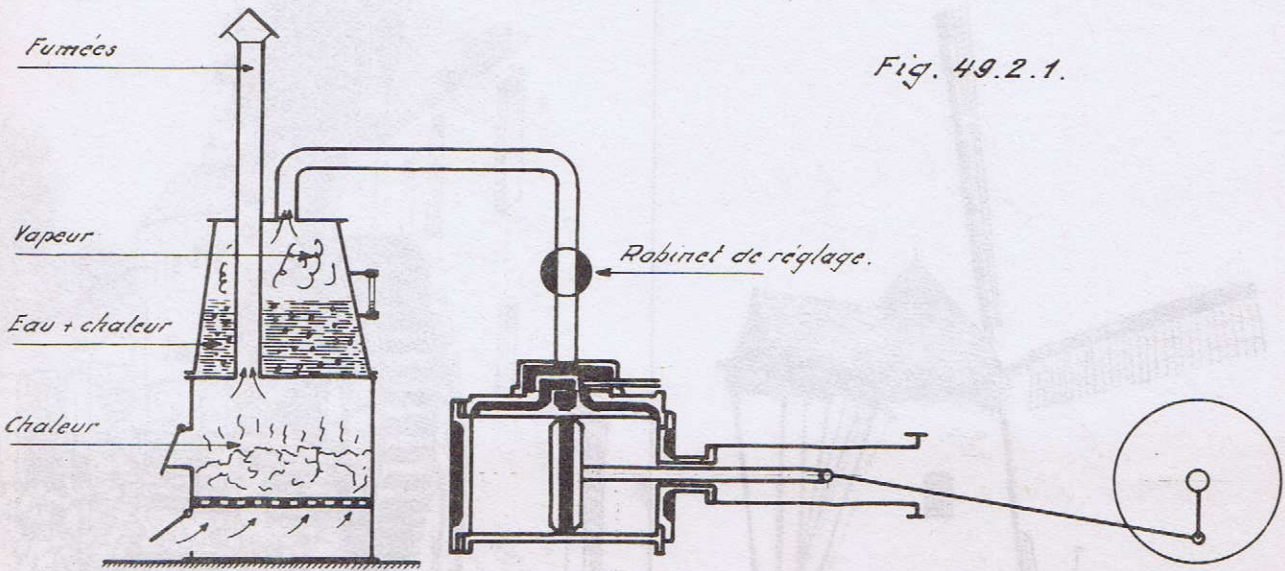
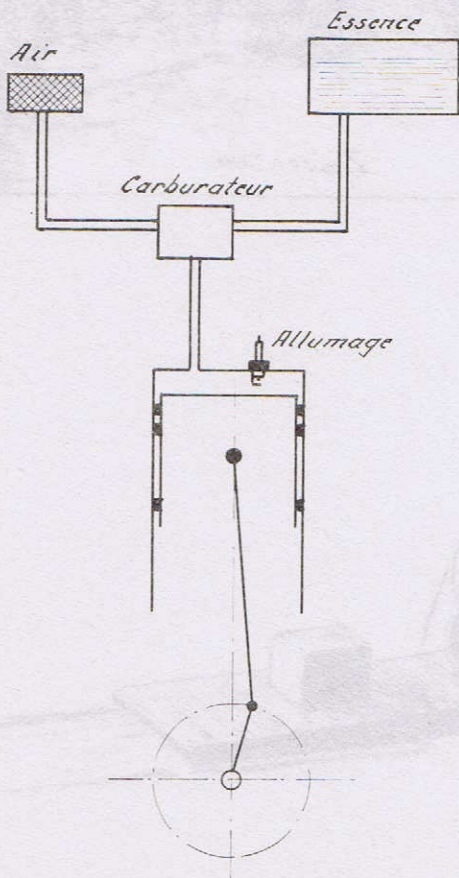


Fig. 49.0.3.

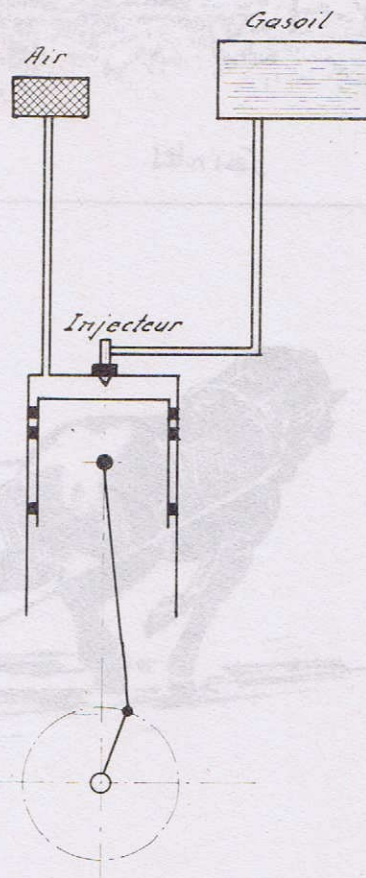
*Machine à vapeur.
Transformation chaleur en → énergie mécanique.*



Moteur à mélange préalable.



Moteur à injection.



MOTEUR A CULBUTEURS

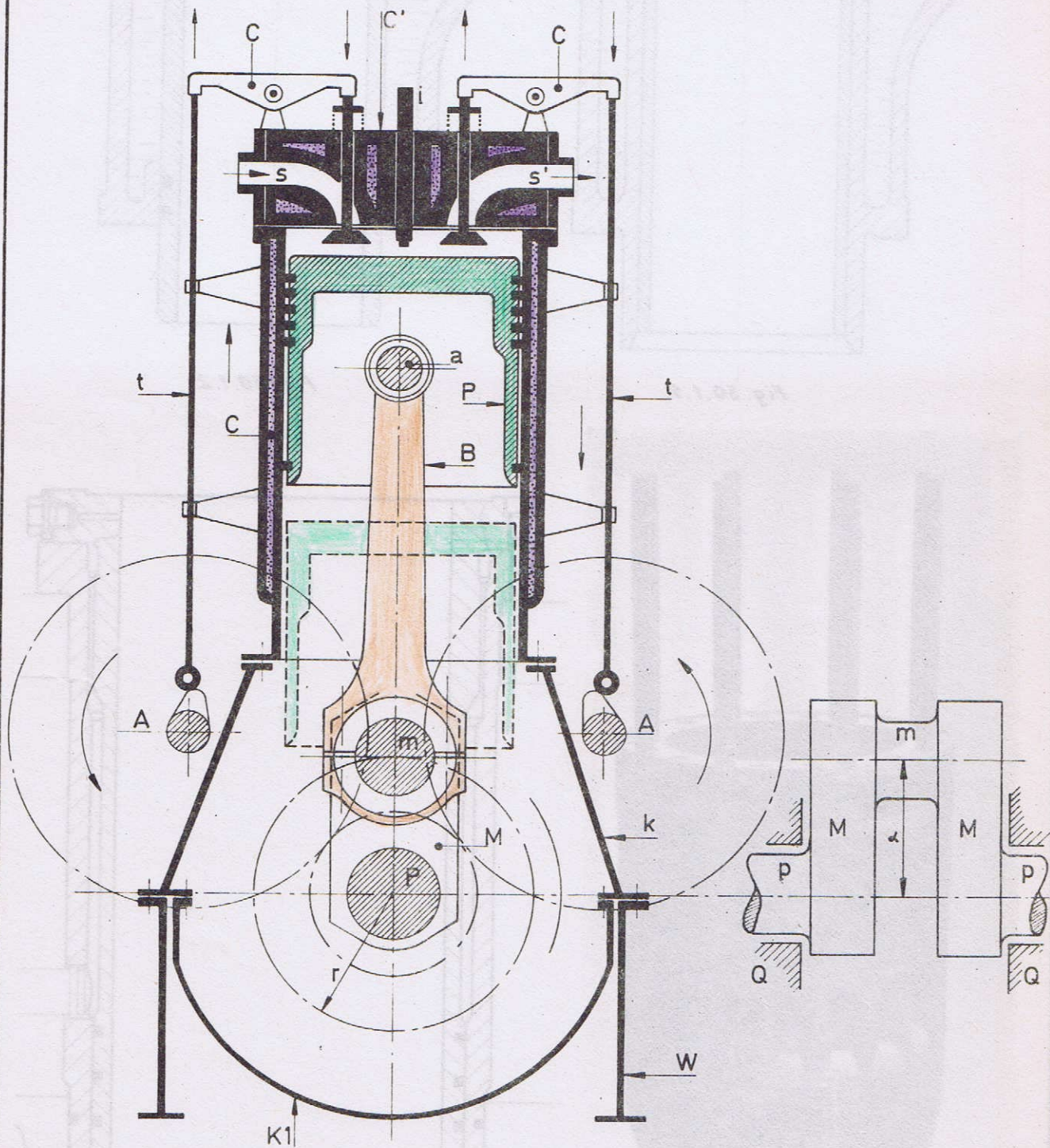


Fig. 50.01

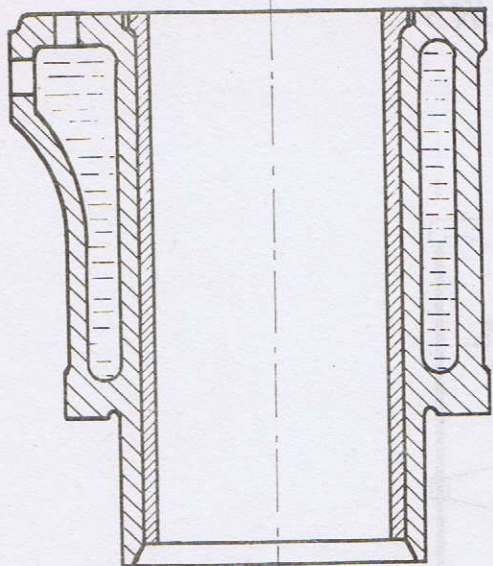


Fig. 50.1.1.

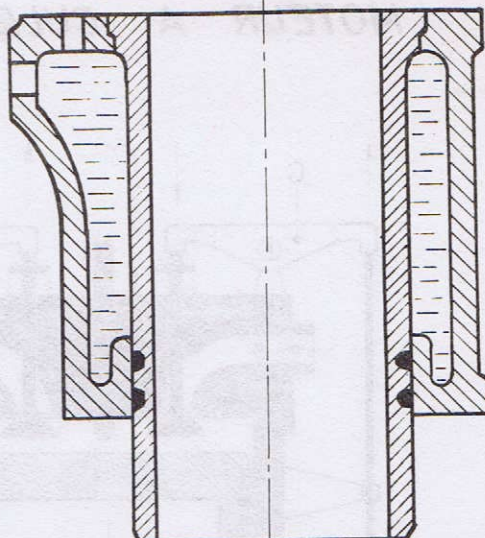


Fig. 50.1.2.

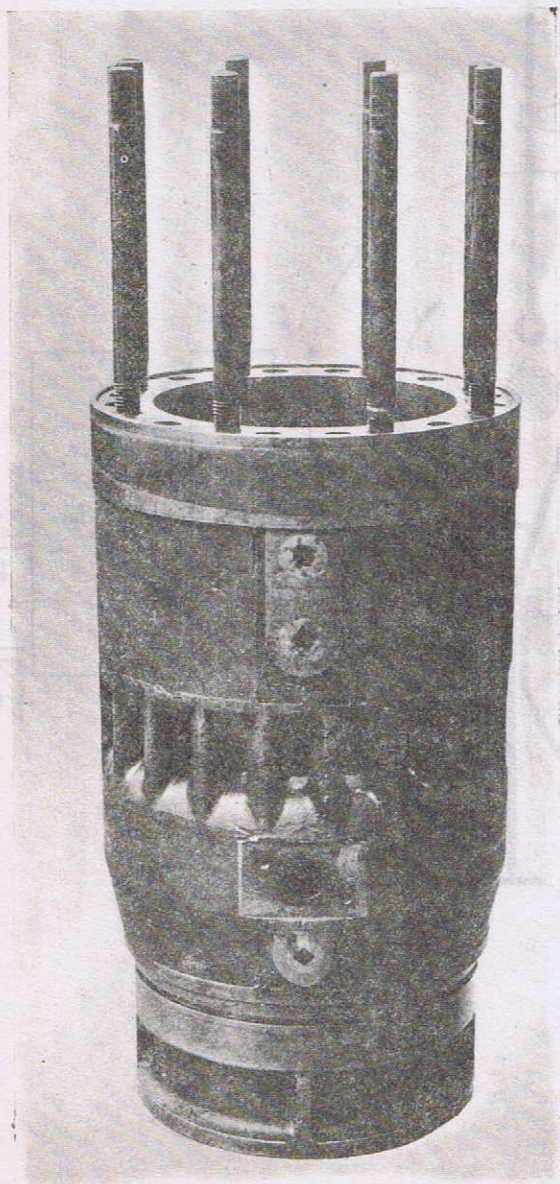


Fig. 50.1.3.

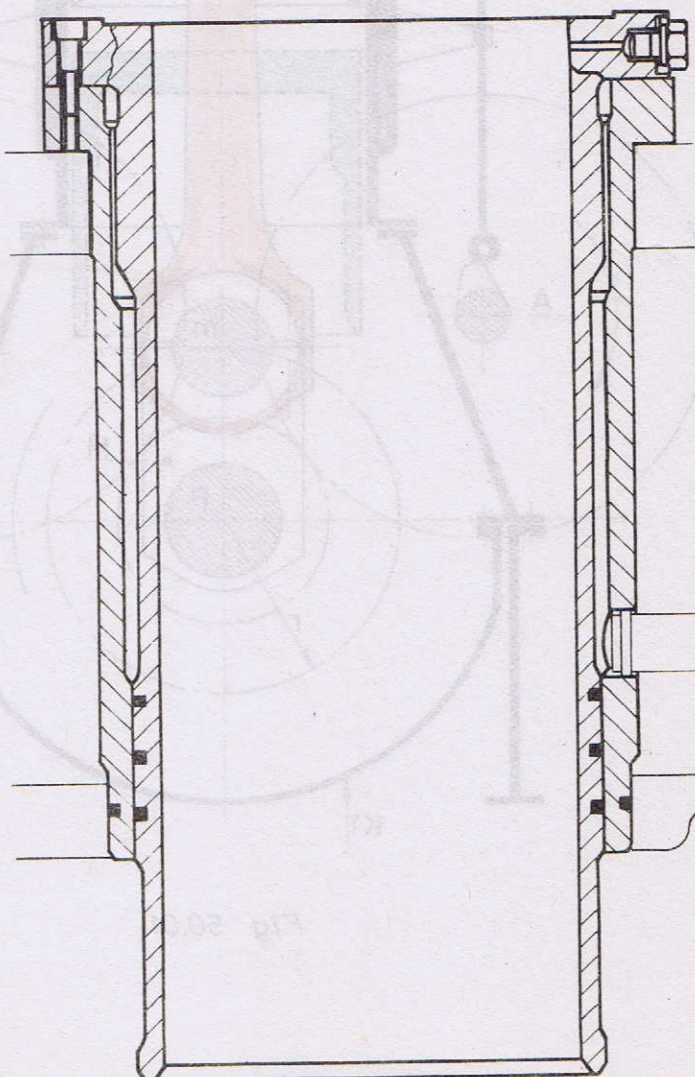


Fig. 50.1.4.

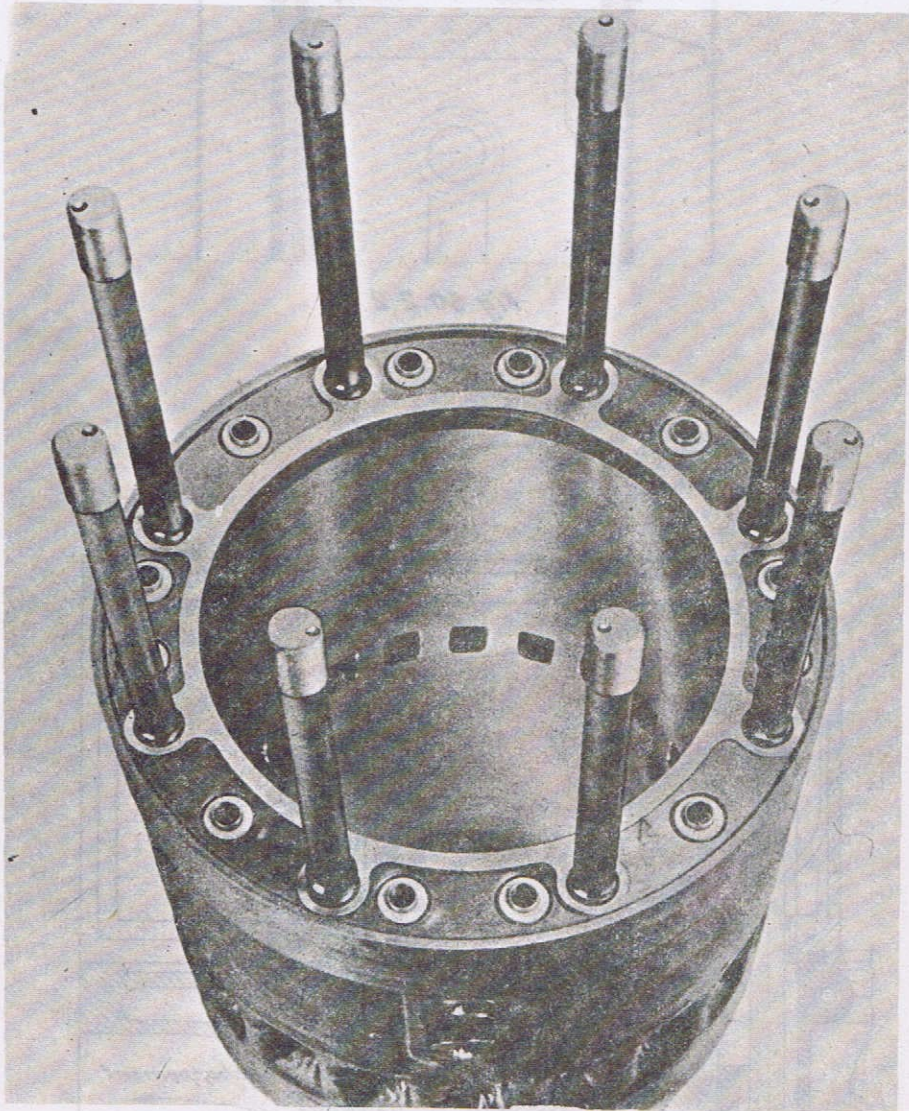


Fig. 50.2.1.

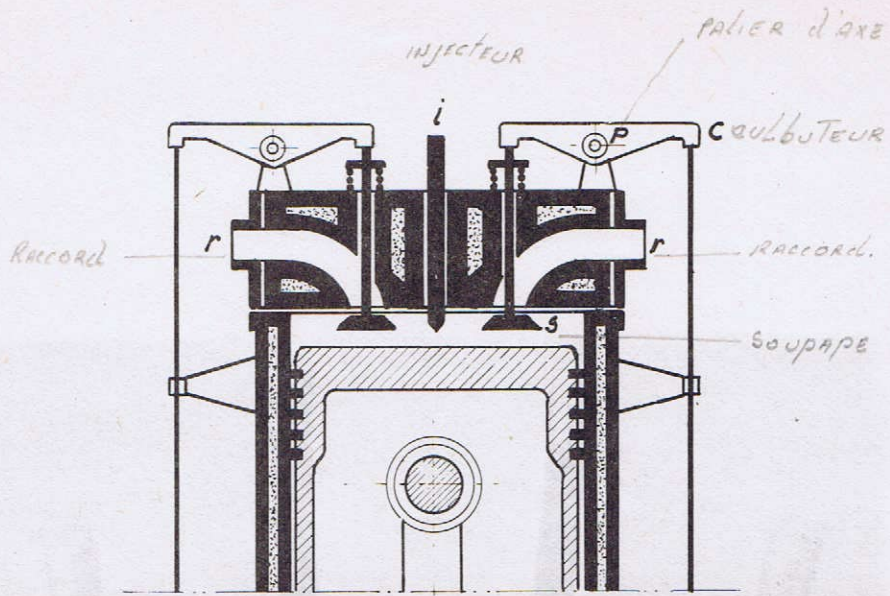


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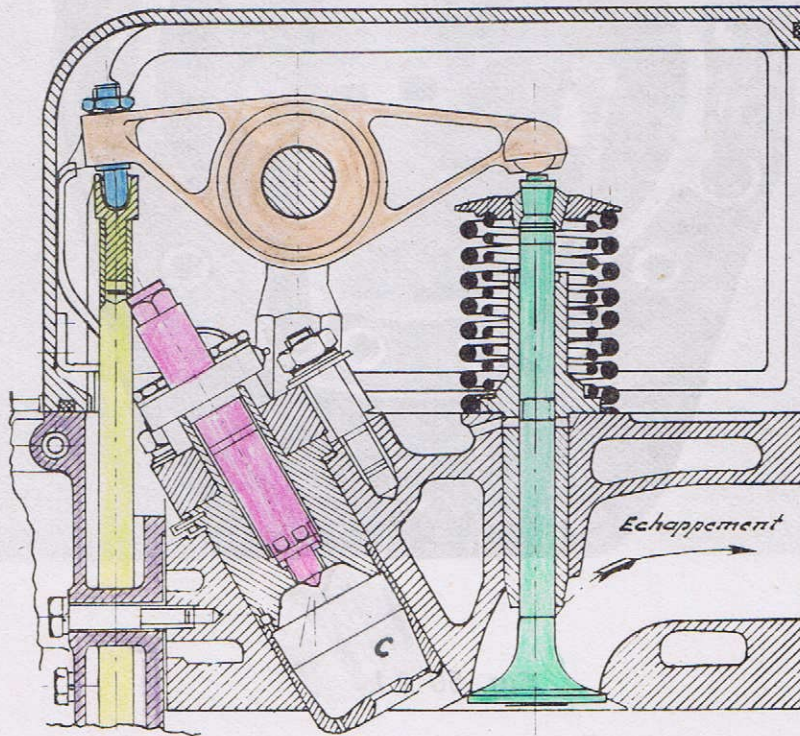


Fig. 50.2.3.

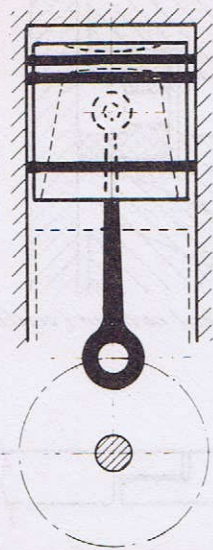


Fig. 50.3.1.

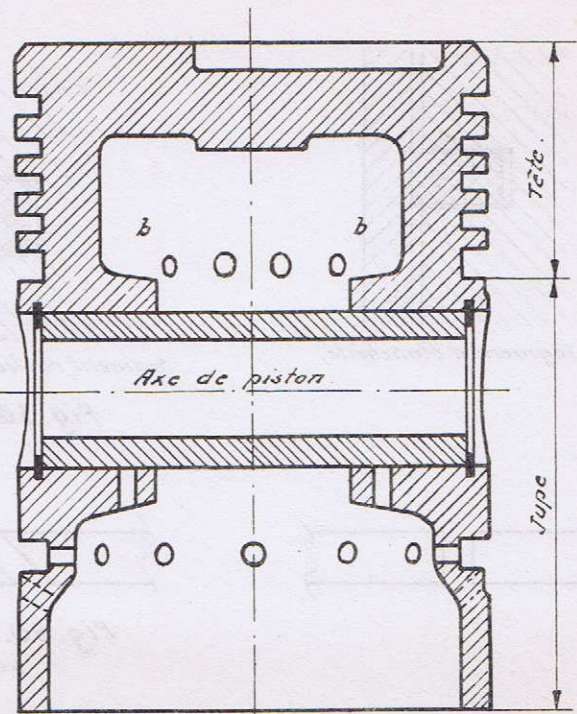
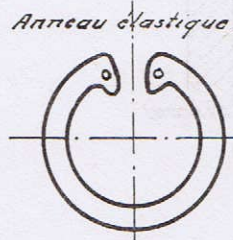


Fig. 50.3.2.

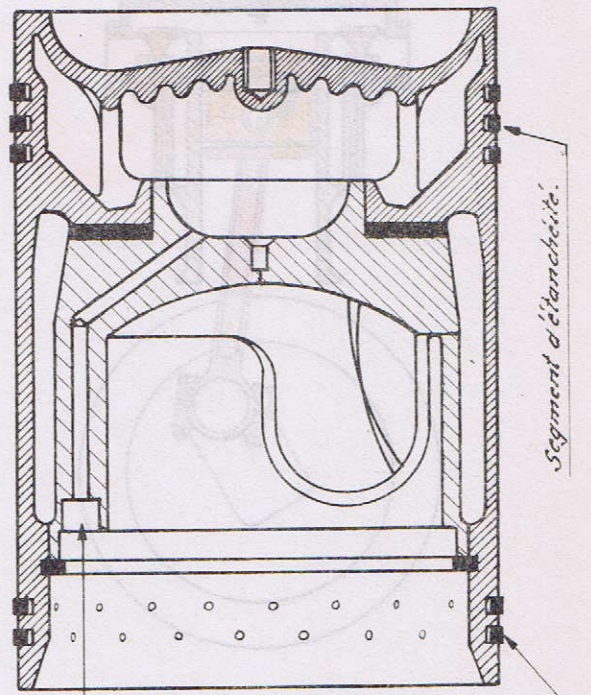
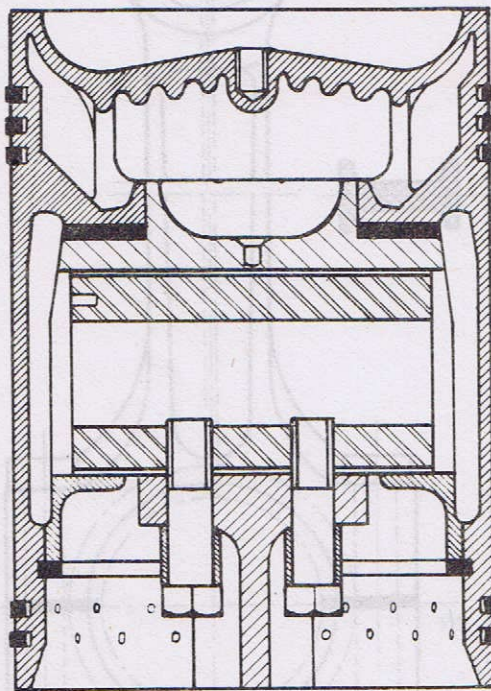
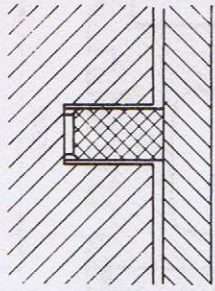
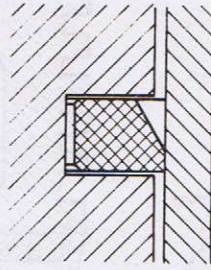


Fig. 50.3.3.

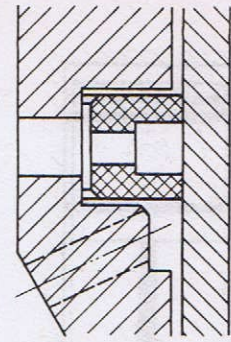


Segment d'étanchéité.



Segment racleur (à biseau).

Fig. 50.4.1.



Segment racleur (ventilé).

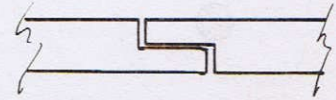
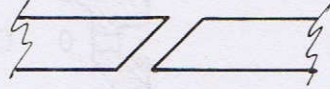
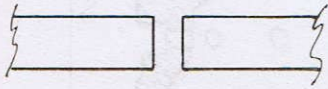


Fig. 50.4.2.

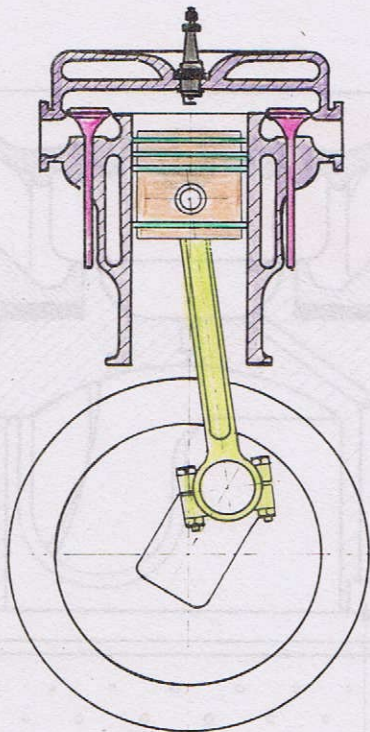


Fig. 50.5.1.

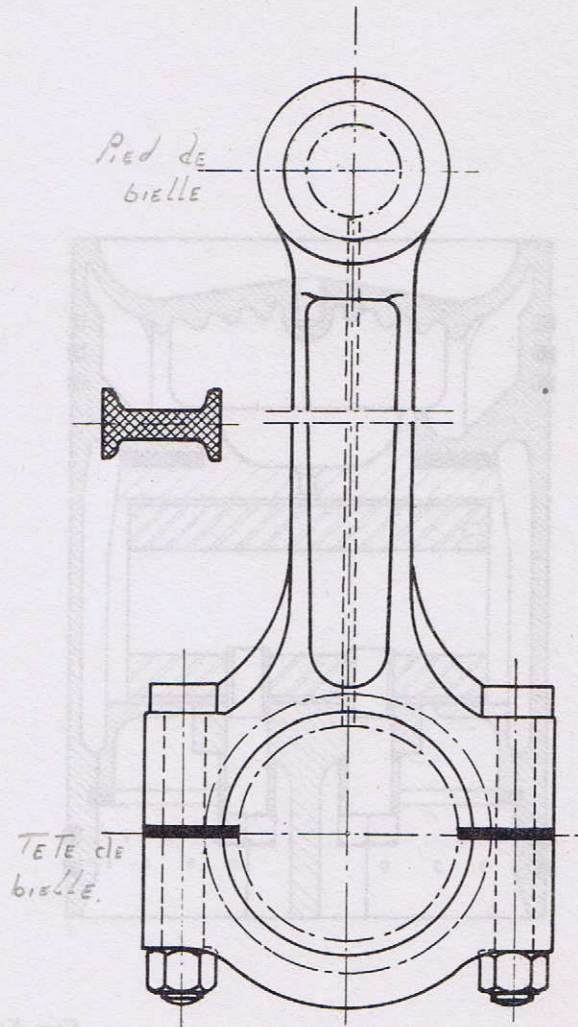


Fig. 50.5.2.

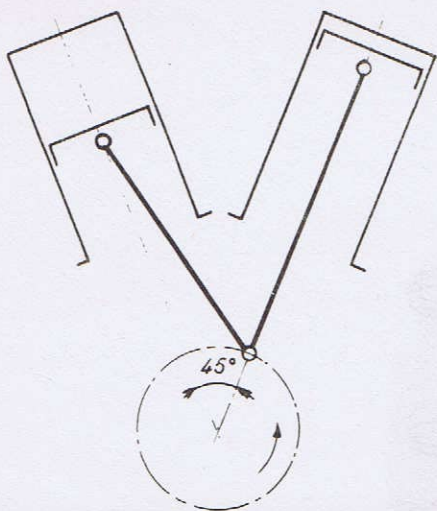


Fig. 50.5.3.

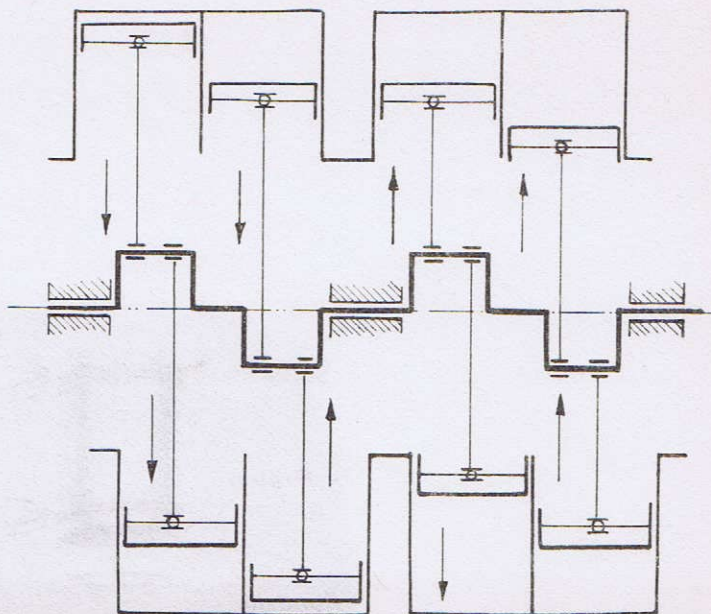


Fig. 50.5.4.

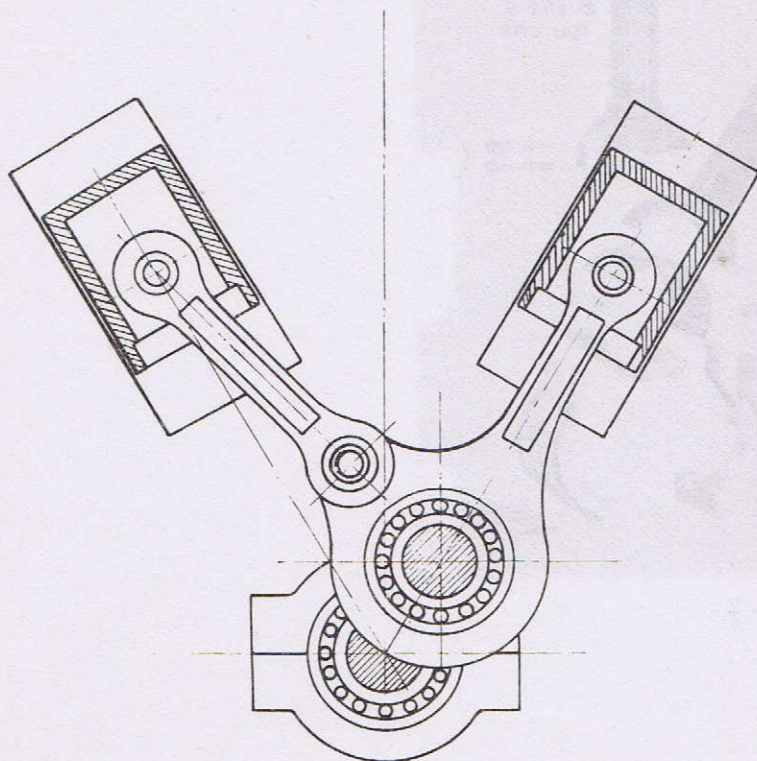


Fig. 50.5.5.

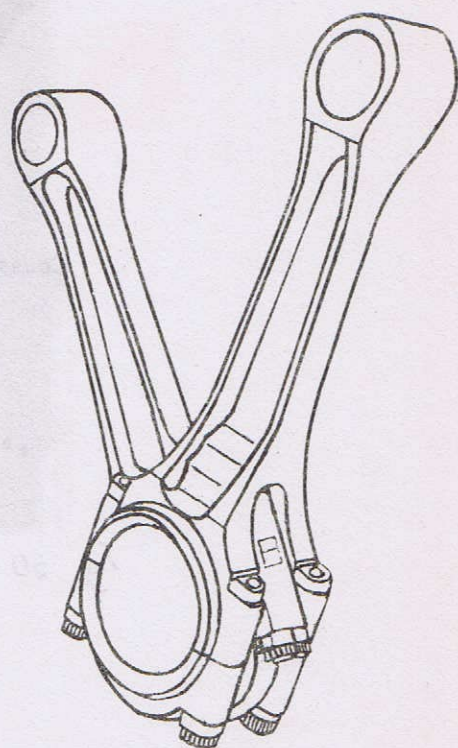


Fig. 50.5.6.

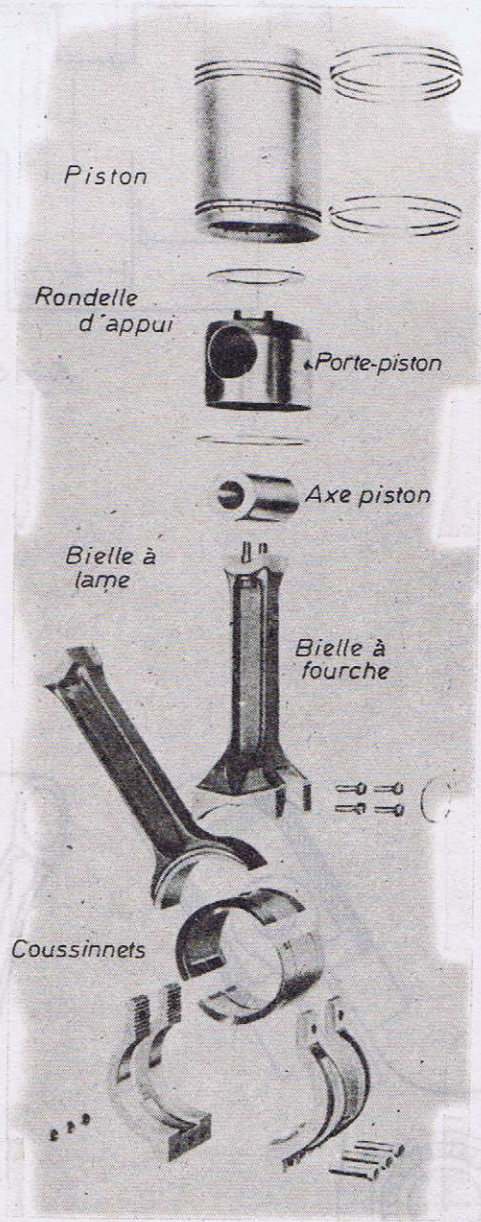


fig 50-5-7

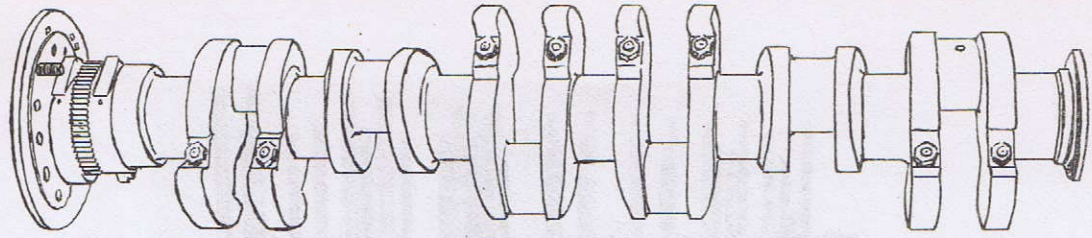


Fig. 51.0.1.

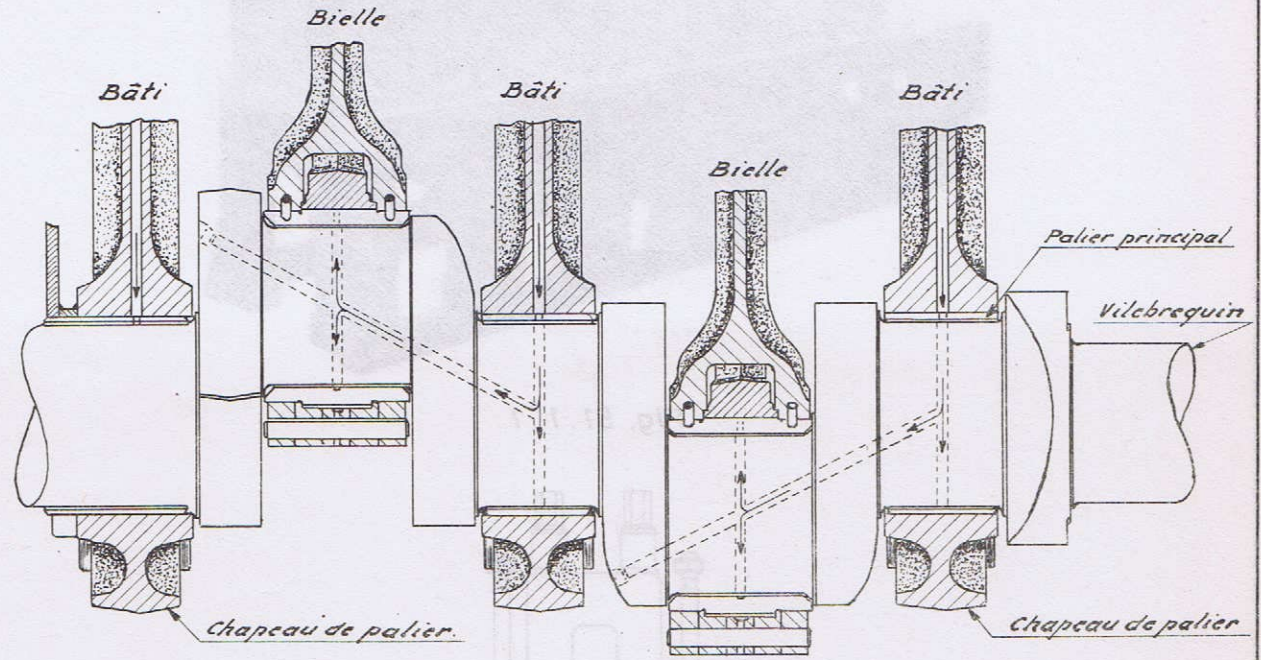


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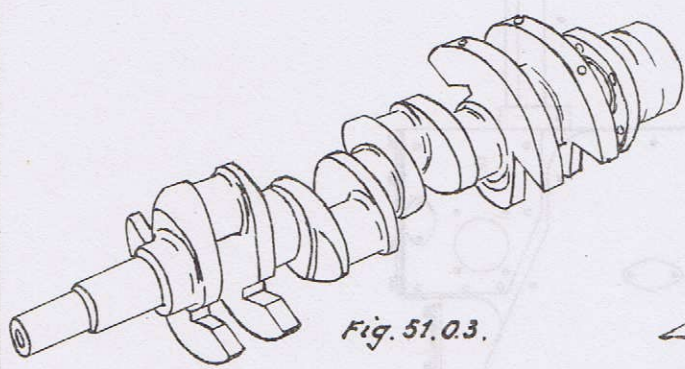


Fig. 51.0.3.

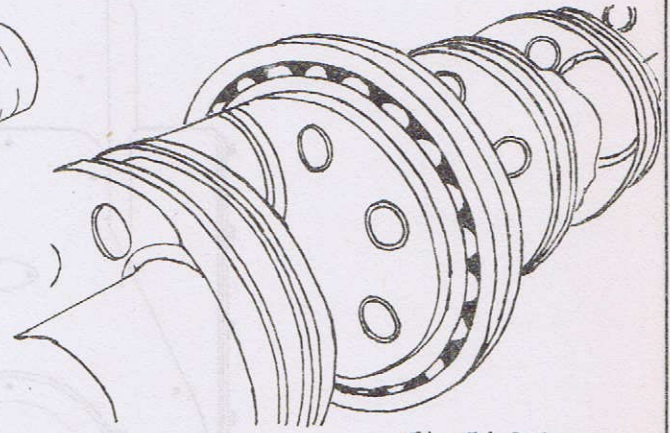


Fig. 51.0.5.

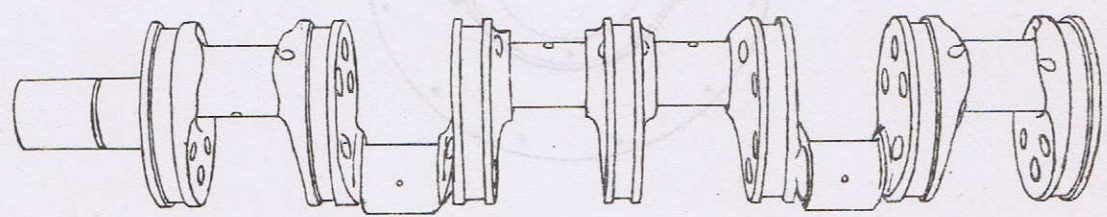


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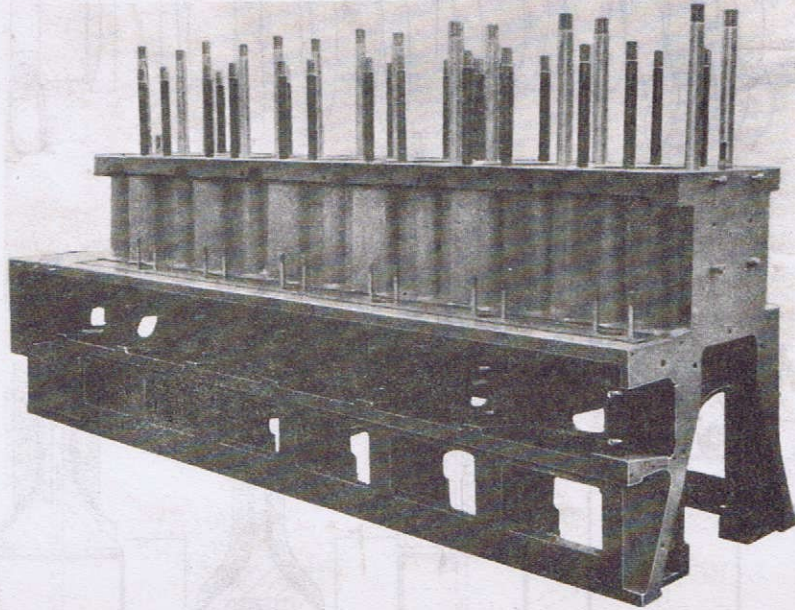


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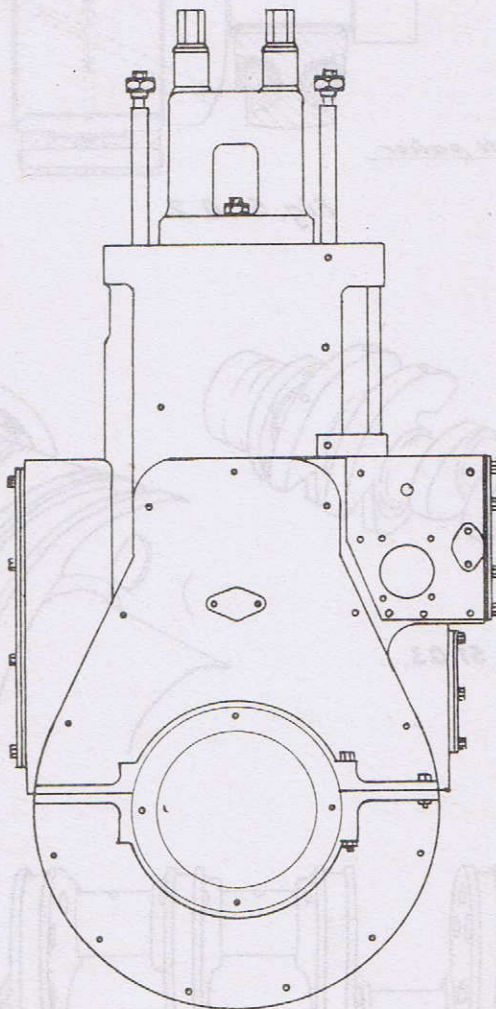


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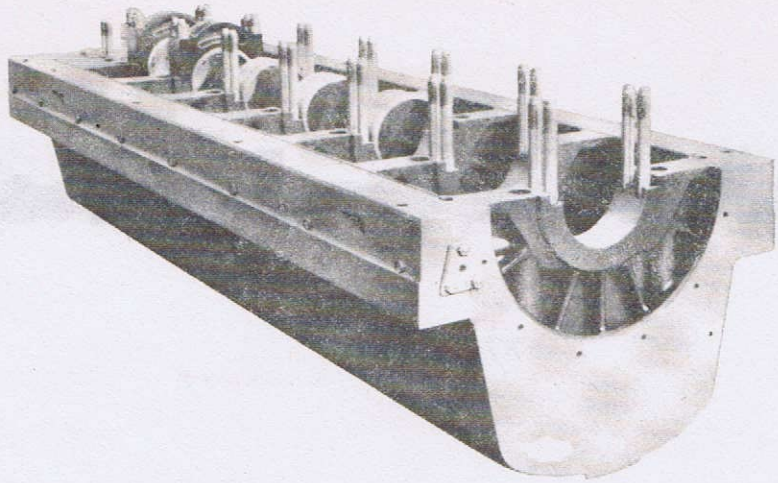


Fig. 51.1.3.

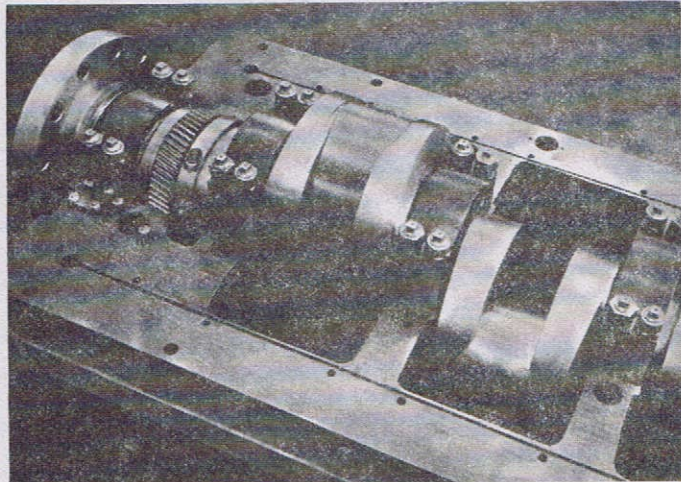


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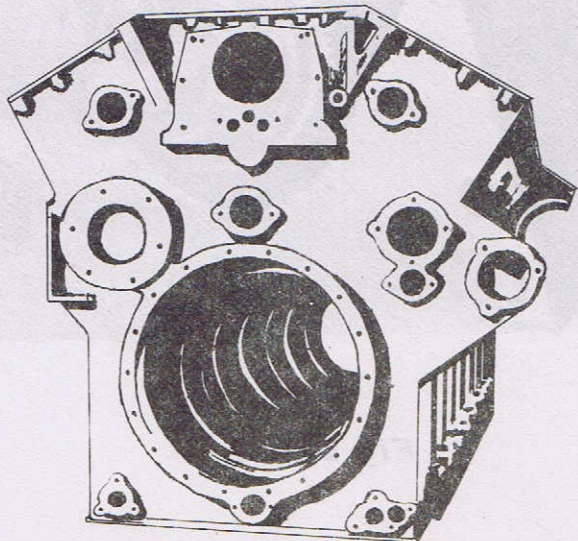


Fig. 51.1.5.



Fig. 51.3.1.

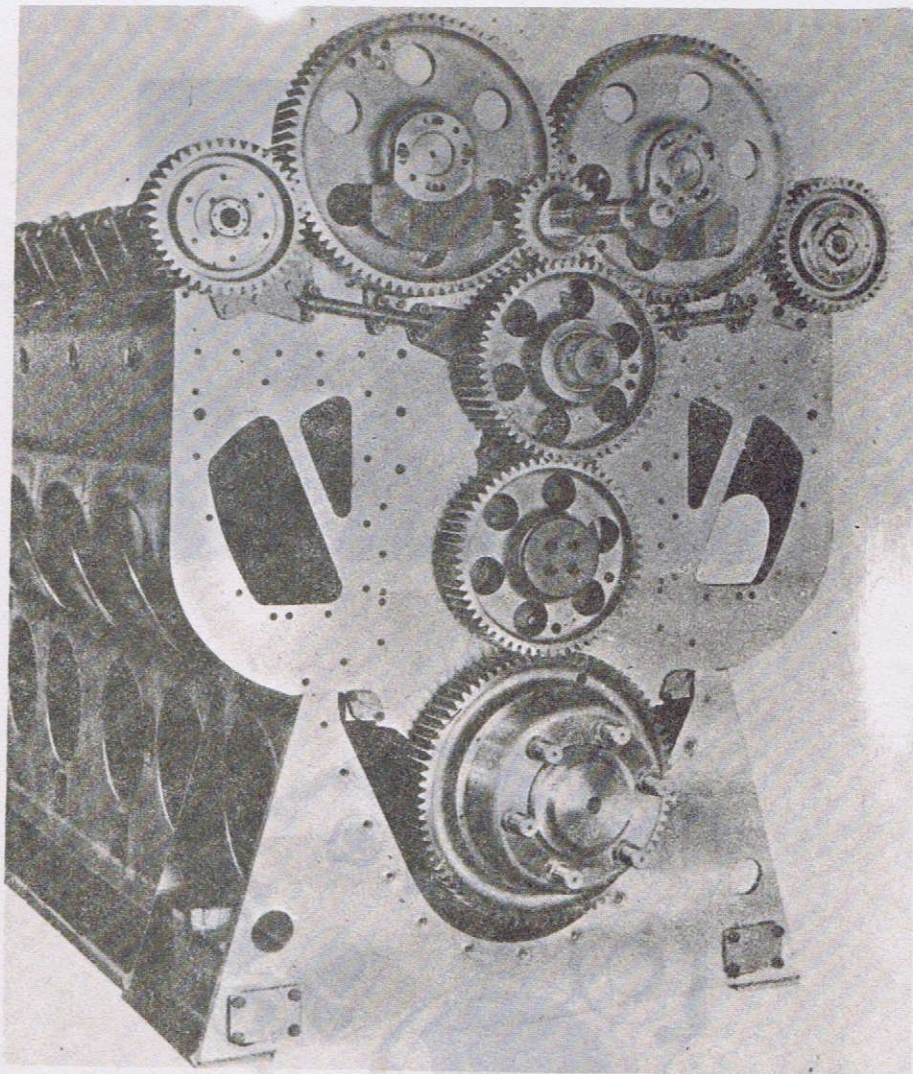


Fig. 51.3.2.

ARBRE à came commandant les 4 soupapes d'échappement

Arbre à came commandant injecteur pompe

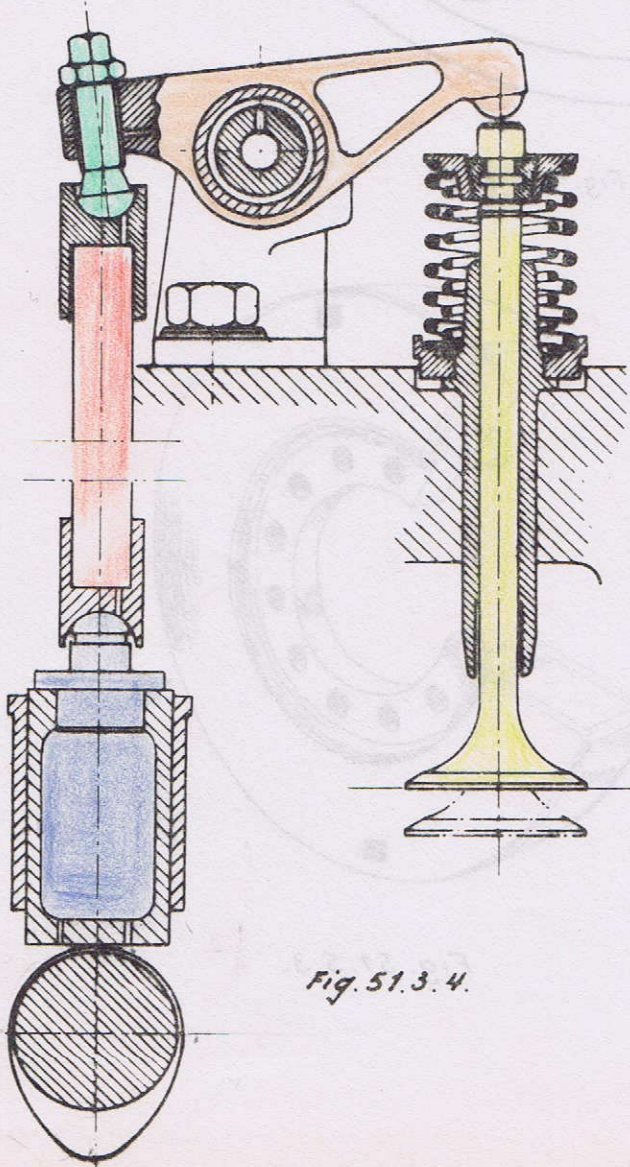
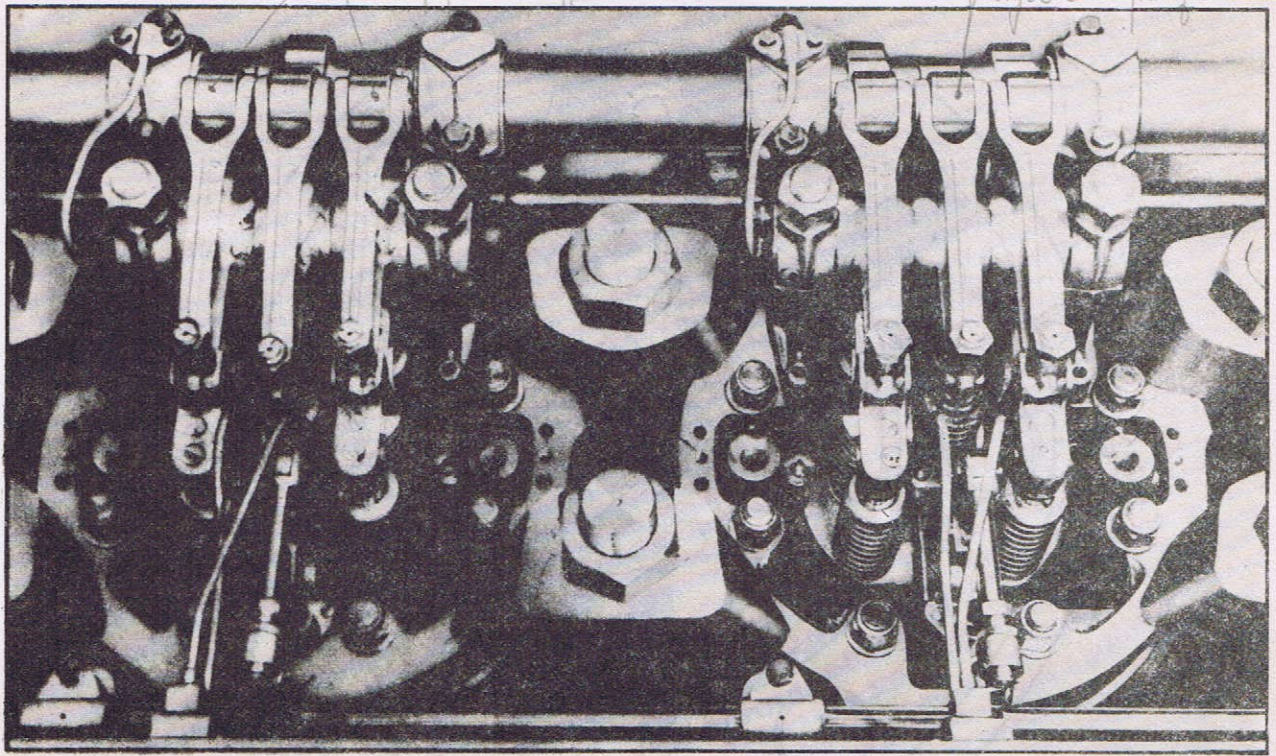


Fig. 51.3.4.

Fig. 51.3.3.

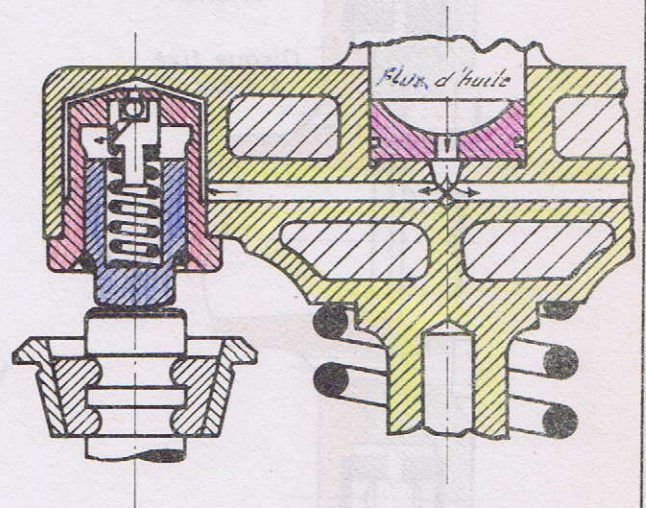


Fig. 51.3.5.

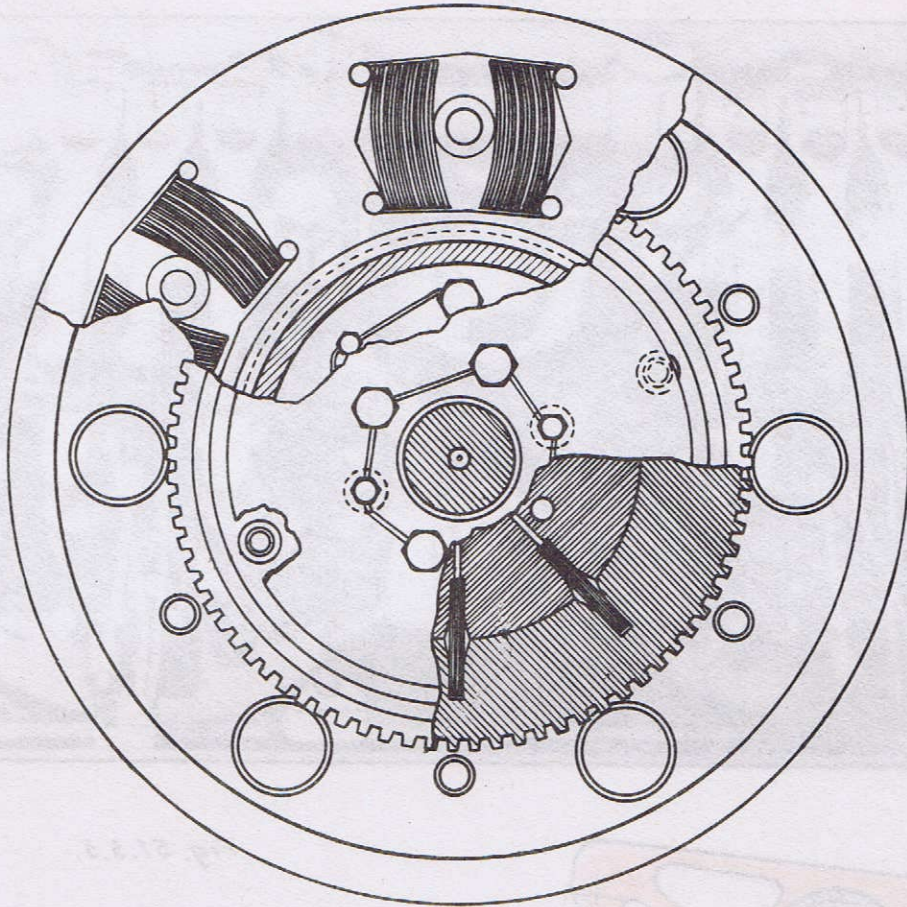


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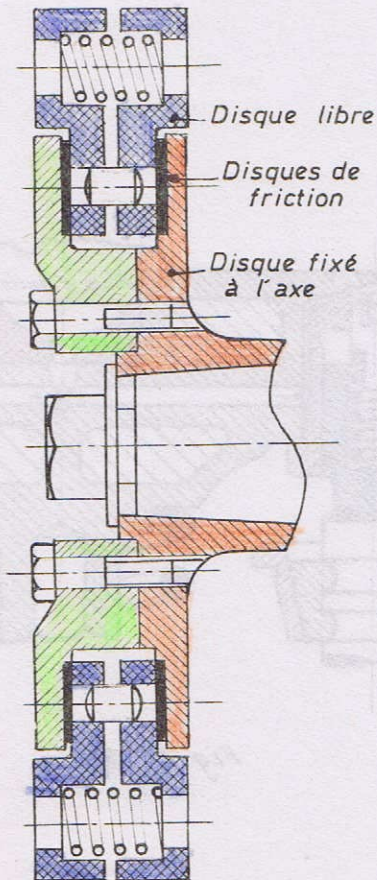


Fig. 51.5.1.

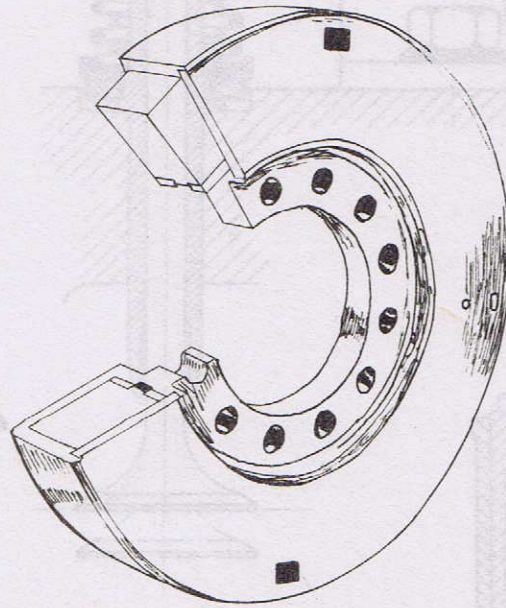


Fig. 51.5.3.

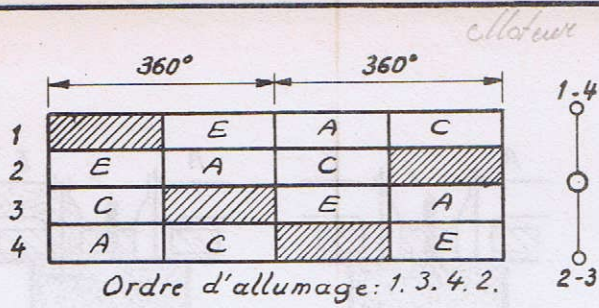


Fig. 53.3.1.

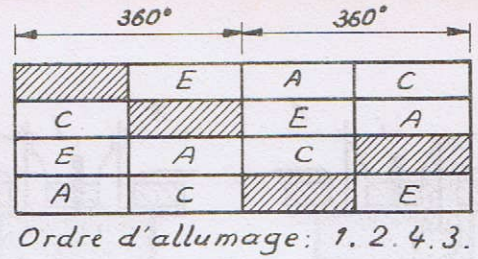


Fig. 53.3.2.

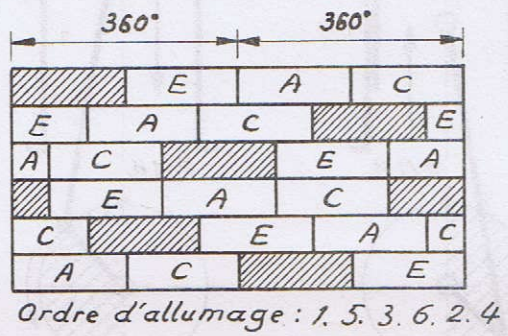
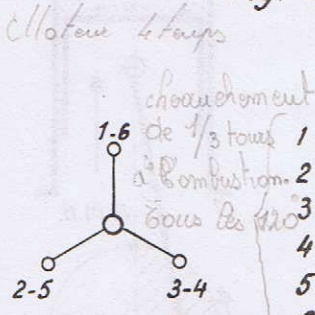
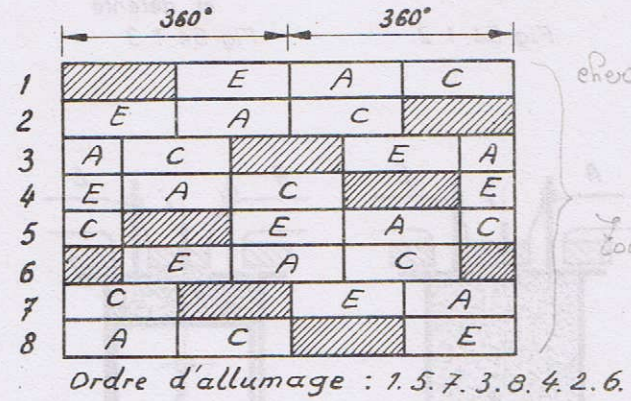
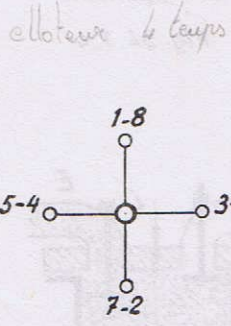


Fig. 53.3.3.

A = Admission
E = Echappement
C = Compression
/// = Combustion



choquement de 1/3 tours à la combustion tous les 90°

Fig. 53.3.4.

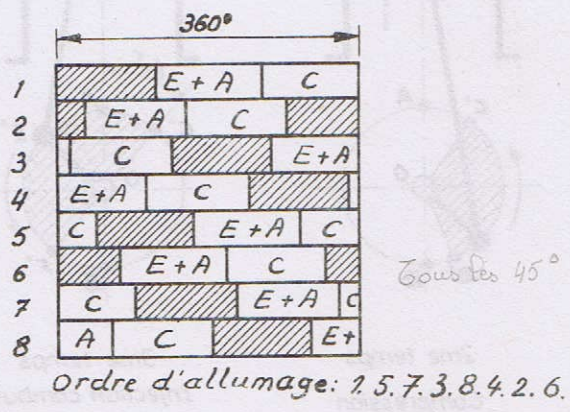
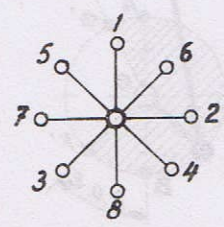
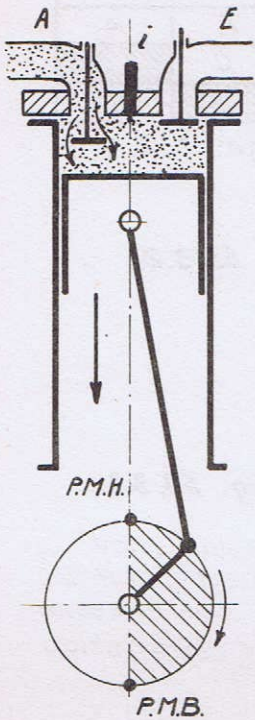
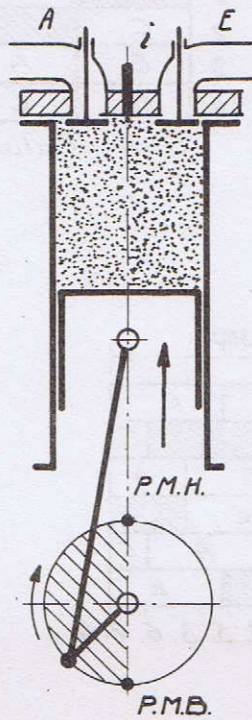


Fig. 53.3.5.

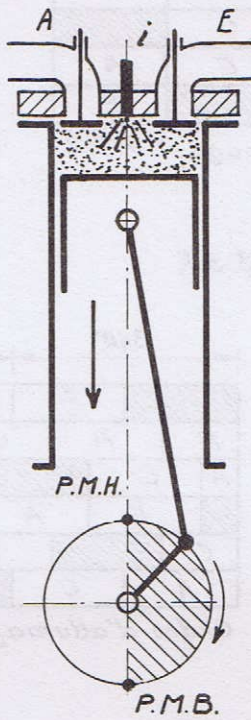
tous les 45°



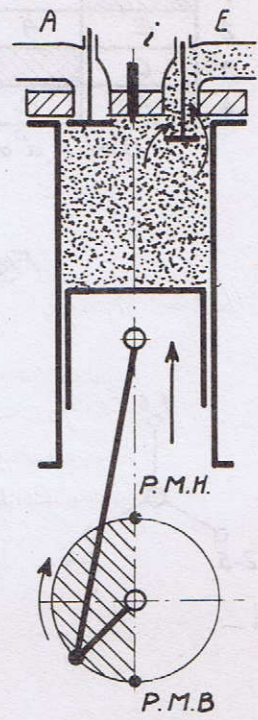
1er temps
Admission
Fig. 54.1.1.



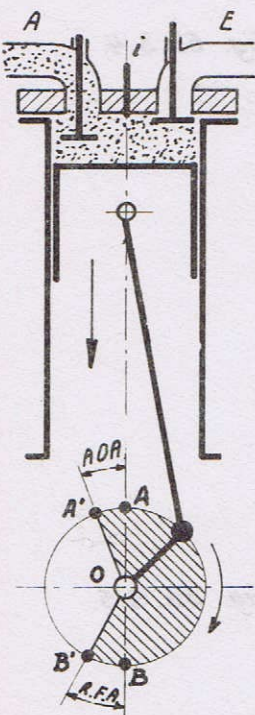
2me temps
Compression
Fig. 54.1.2.



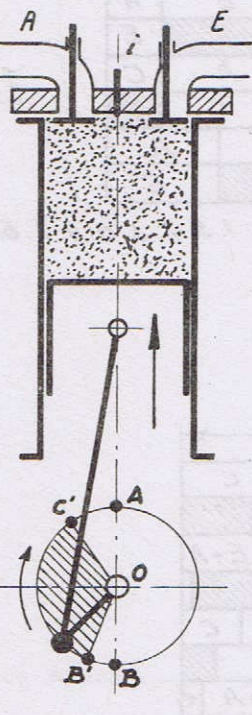
3me temps
Injection combustion
et détente
Fig. 54.1.3.



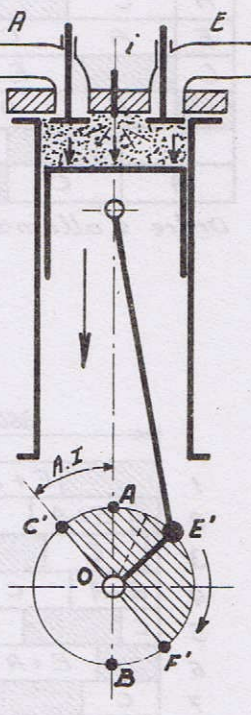
4me temps
Echappement
Fig. 54.1.4.



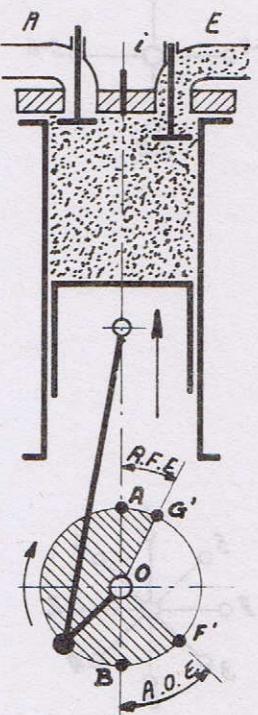
1er temps
Admission
Fig. 54.3.1.



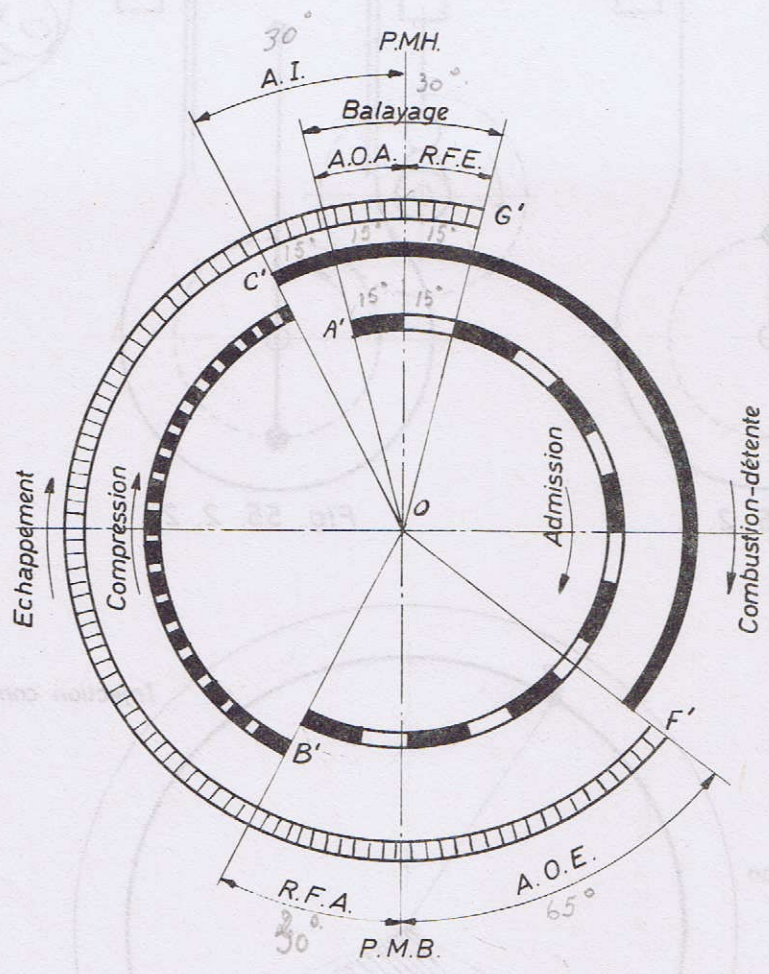
2me temps
Compression
Fig. 54.4.1.



3me temps
Injection combustion
et détente
Fig. 54.5.1.



4me temps
Echappement
Fig. 54.7.1.



- AI - avance injection
- RFA - retard fermeture admission
- AOE - avance ouverture echappement
- RFE - retard fermeture echappement
- AOA - avance ouverture admission

Fig. 54. 2. 1.

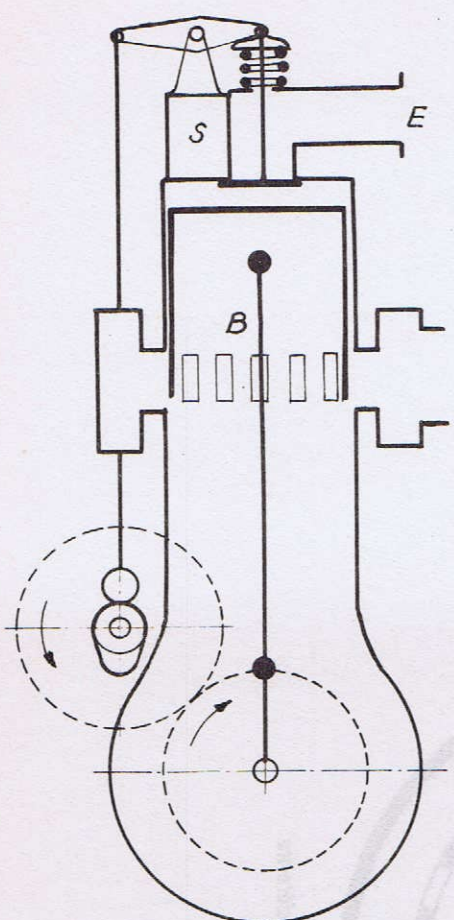


Fig. 55. 2. 1.

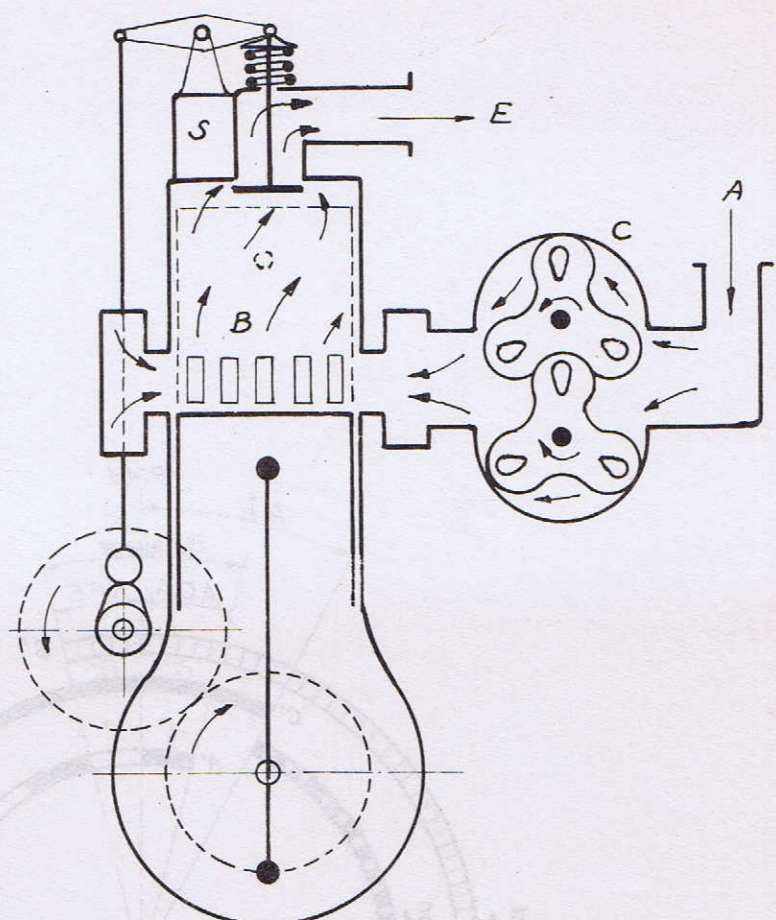


Fig. 55. 2. 2.

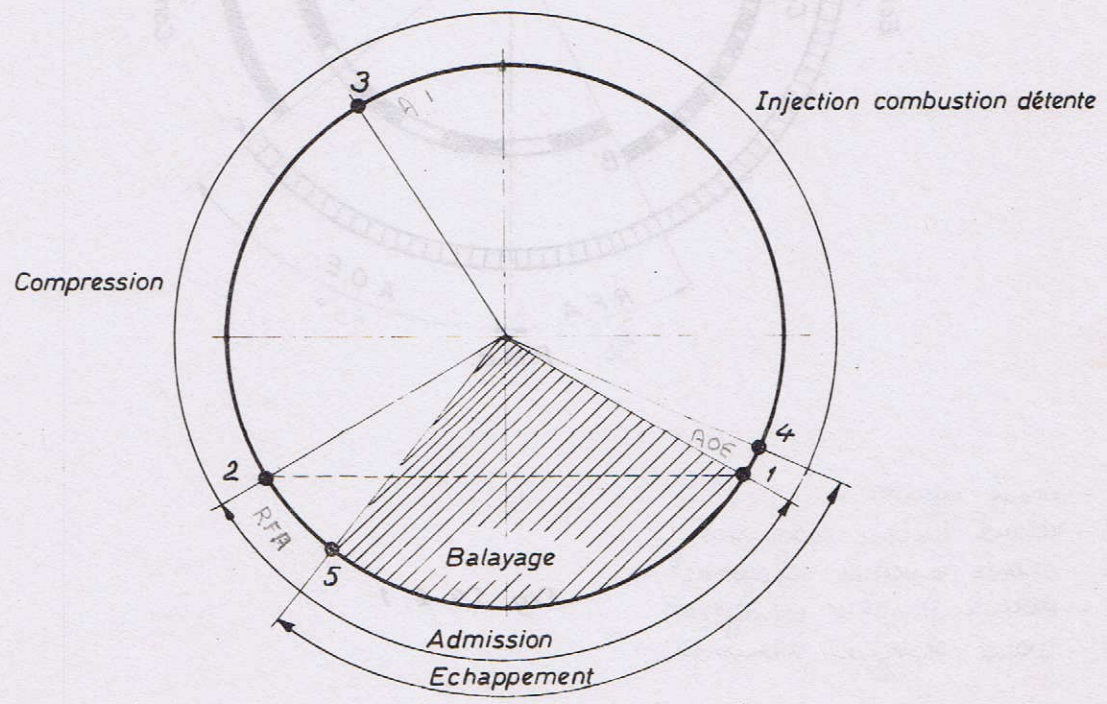


Fig. 55. 3. 1.

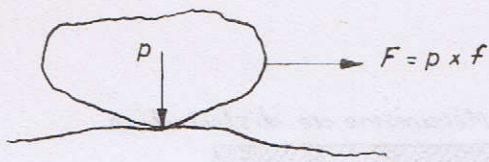


Fig. 57.0.1.

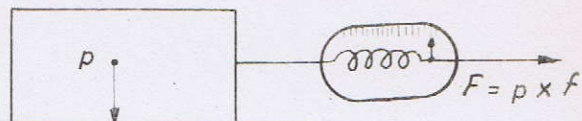


Fig. 57.2.1.

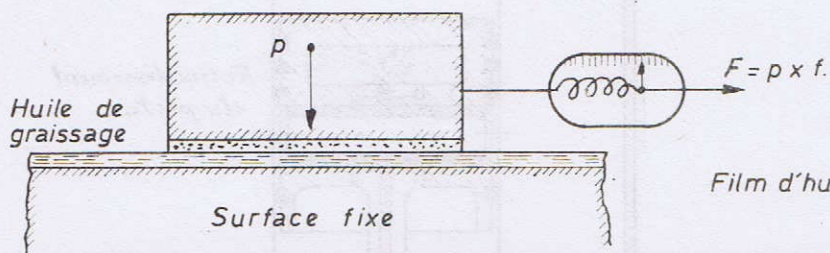


Fig. 57.2.2.

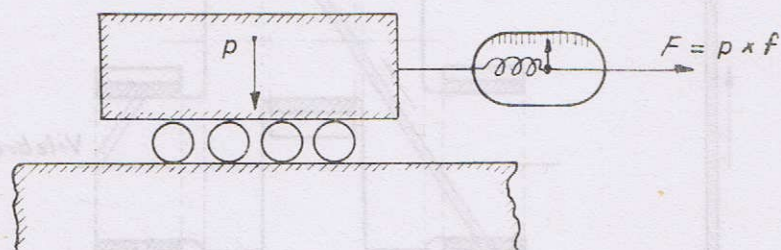
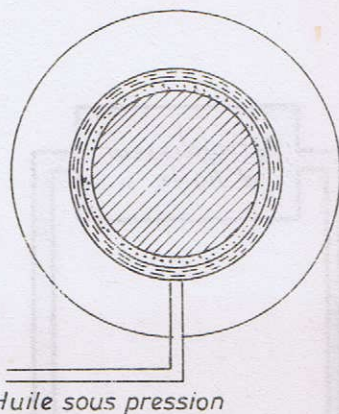


Fig. 57.2.3.

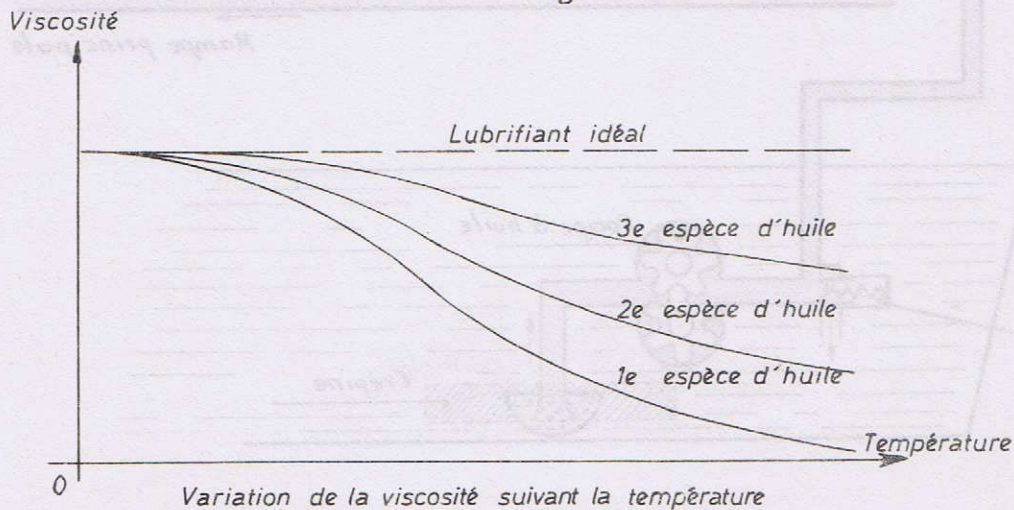


Fig. 57.4.1.

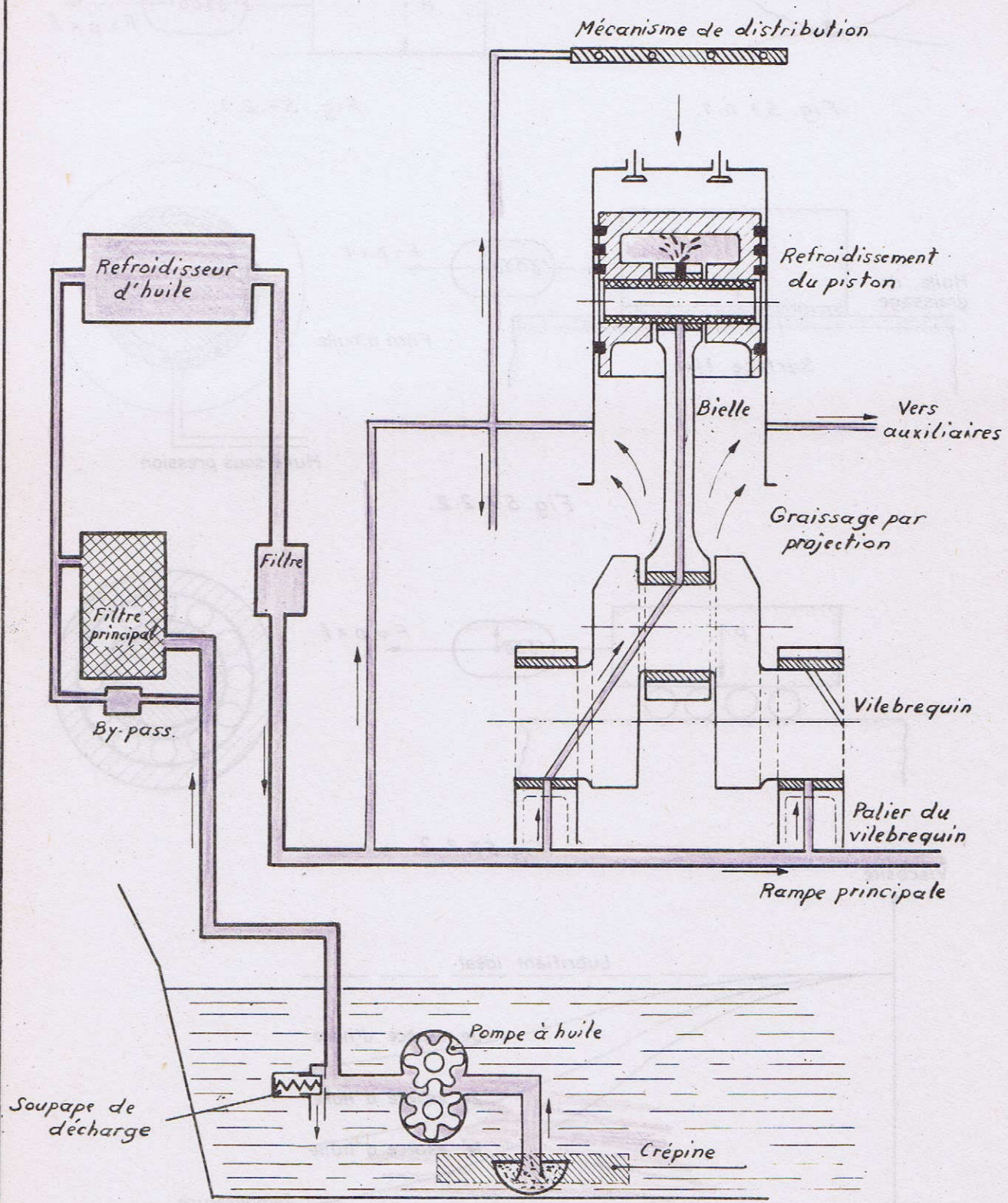


Fig. 58.0.1

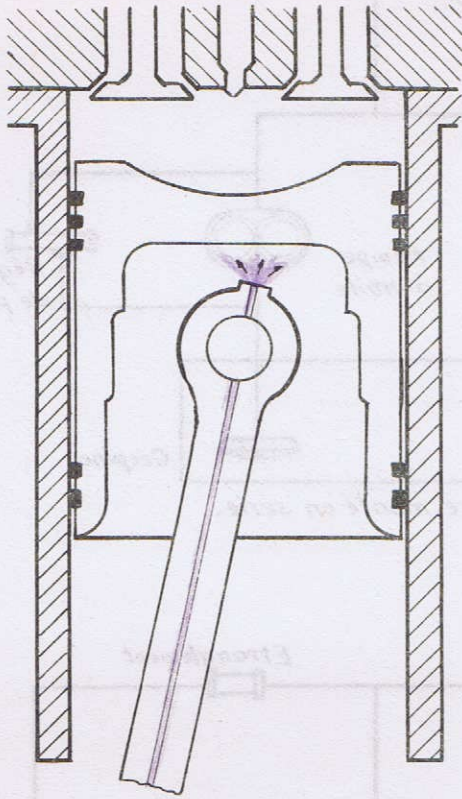


Fig. 58.1.1.

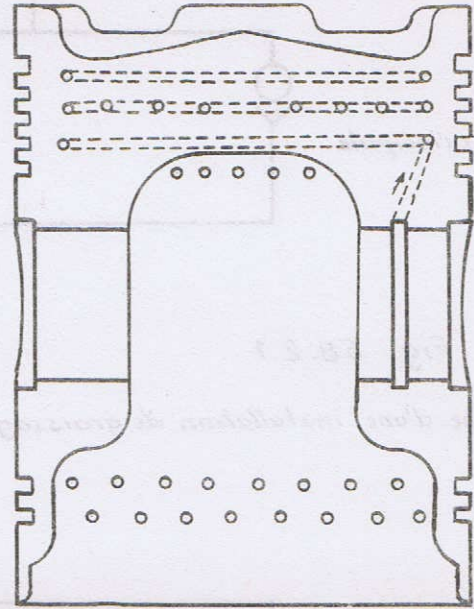
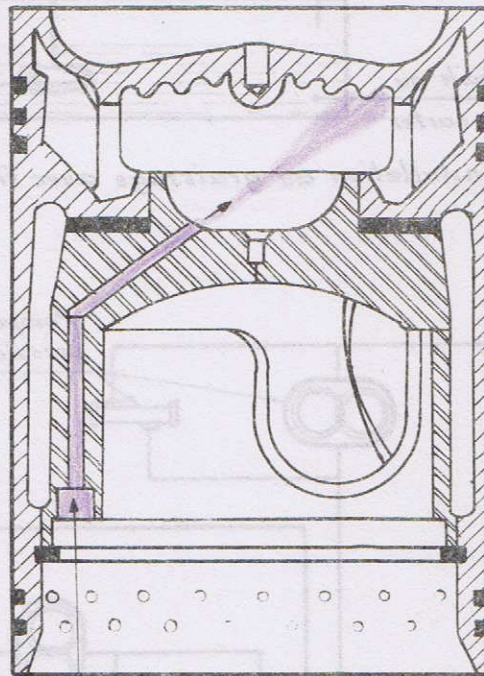


Fig. 58.1.2.



Jet d'huile

Fig. 58.1.3.

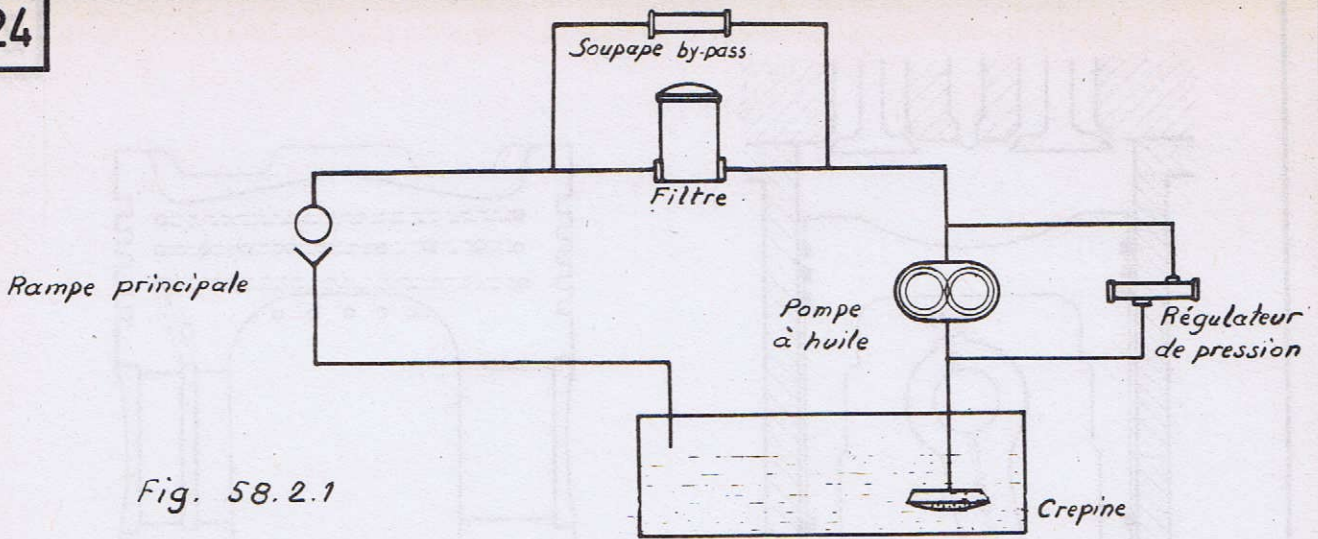


Fig. 58.2.1

Principe d'une installation de graissage avec filtre monté en serie.

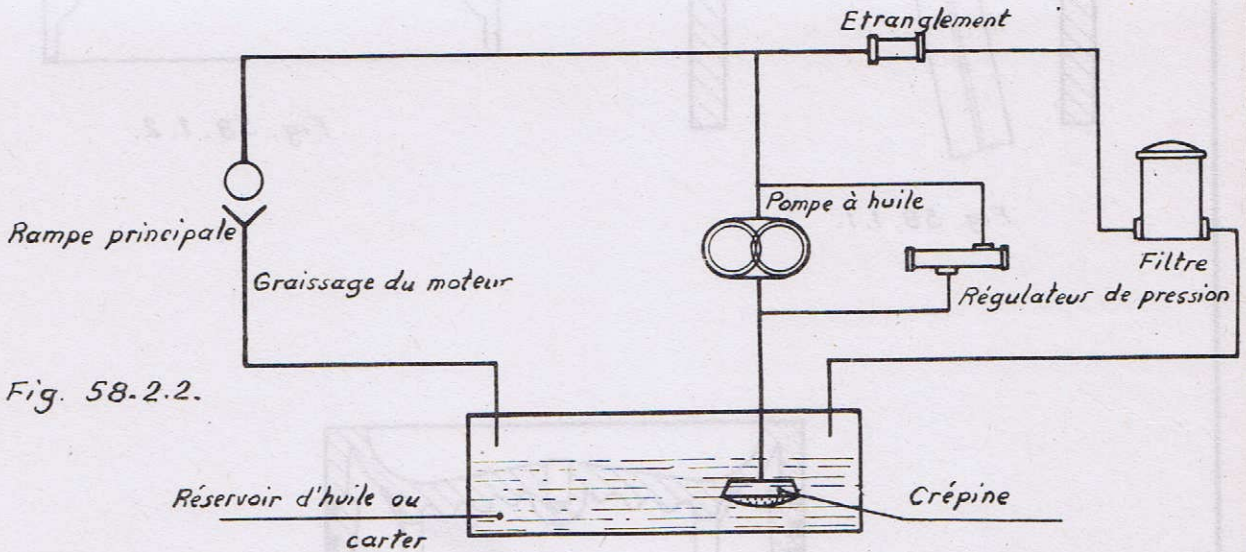


Fig. 58.2.2.

Principe d'une installation de graissage avec filtre monté en parallèle

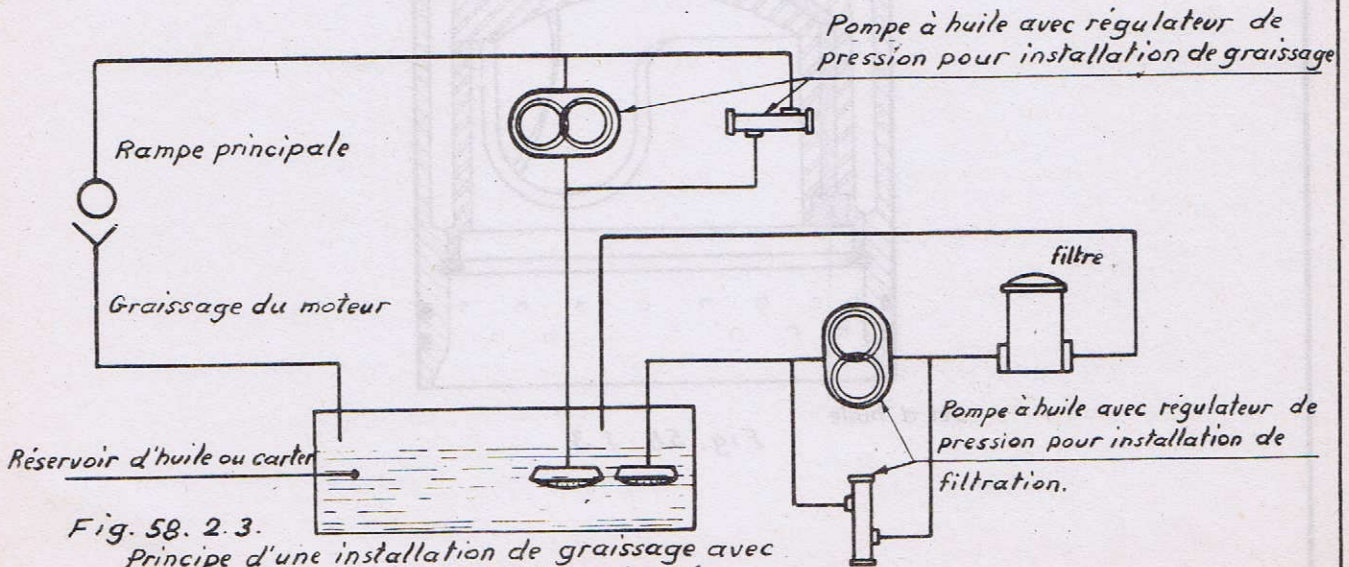


Fig. 58. 2.3.

Principe d'une installation de graissage avec circuit de filtration séparé.

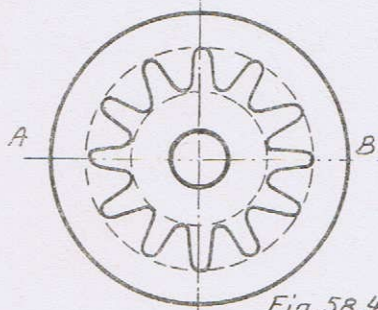
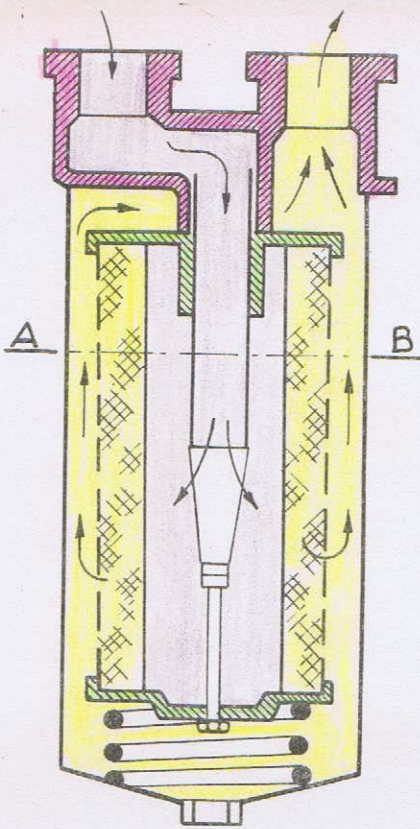


Fig. 58.4.1

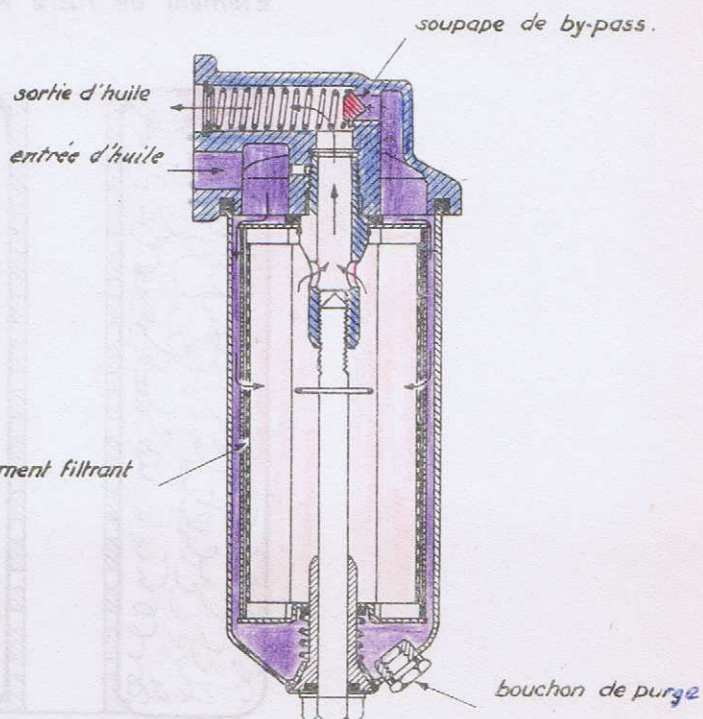


Fig. 58.4.2.

Filter lamellaire à disques métalliques multiples.

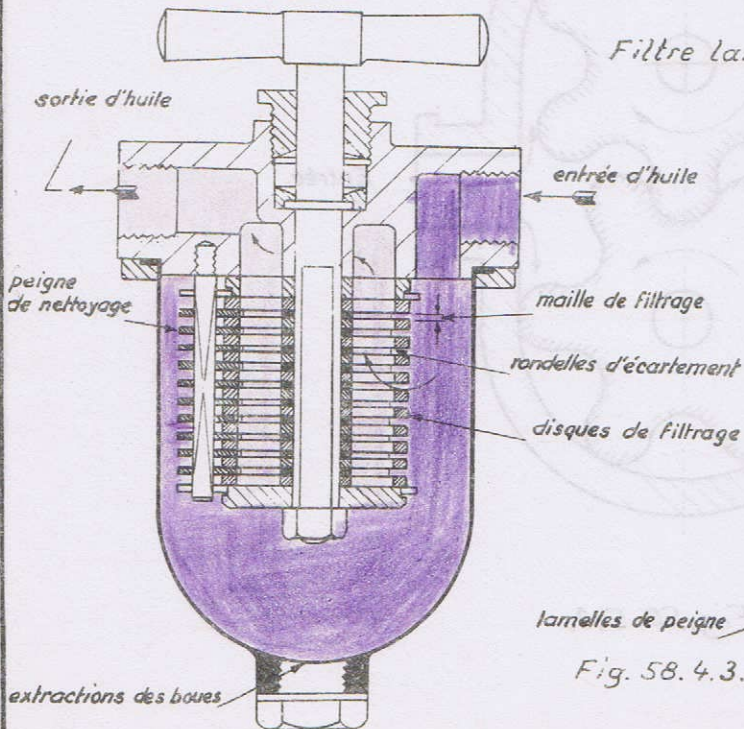
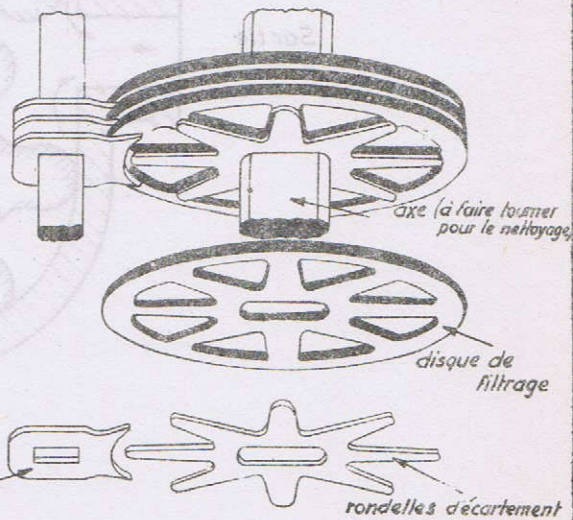


Fig. 58.4.3.



Détail d'assemblage du filtre

Elément de filtre Michiana

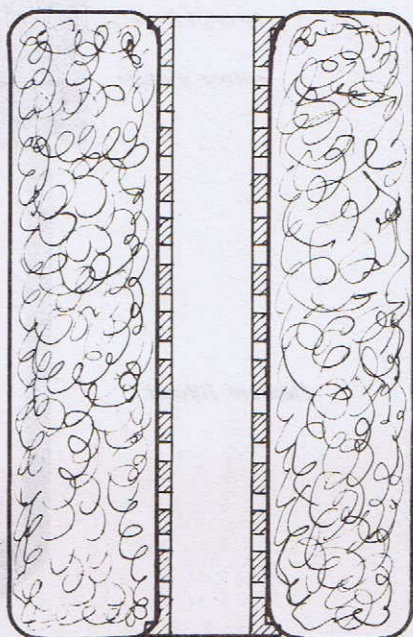


Fig. 58. 4. 4.

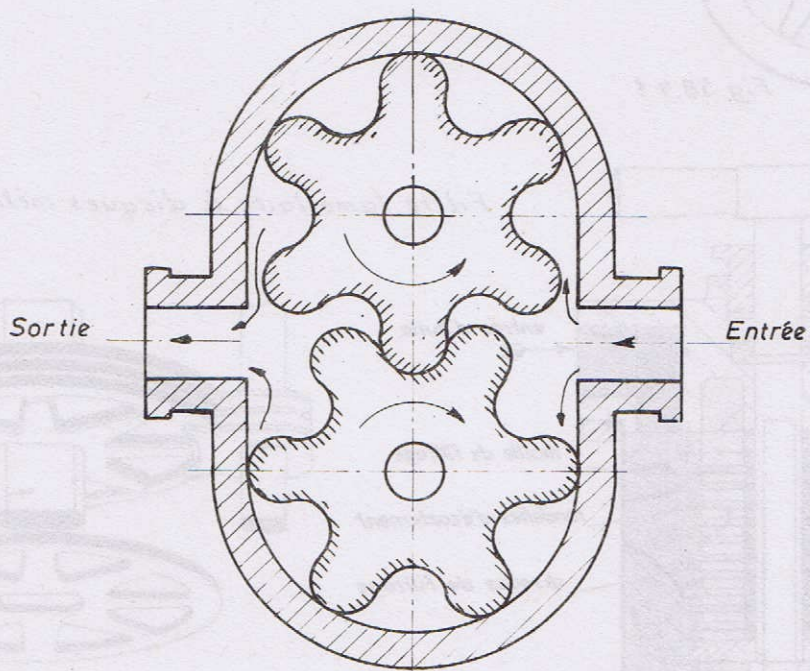


Fig. 58. 5. 1.

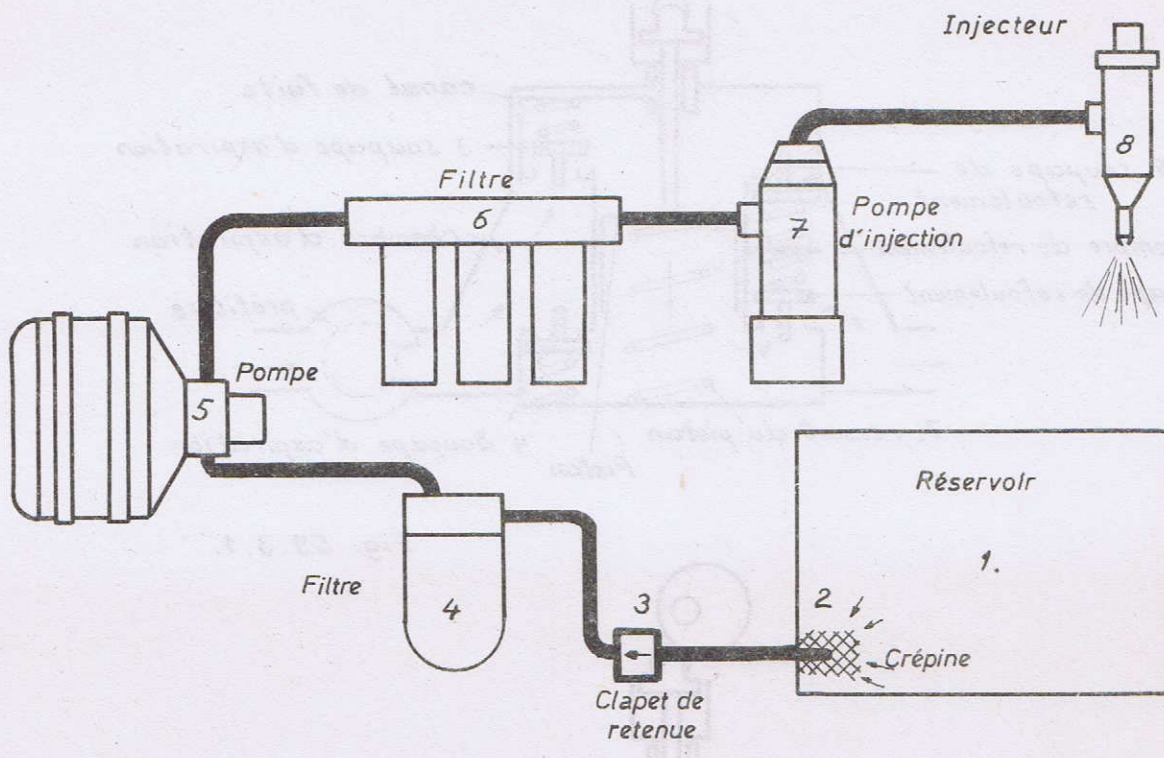


Fig. 59.0.1.

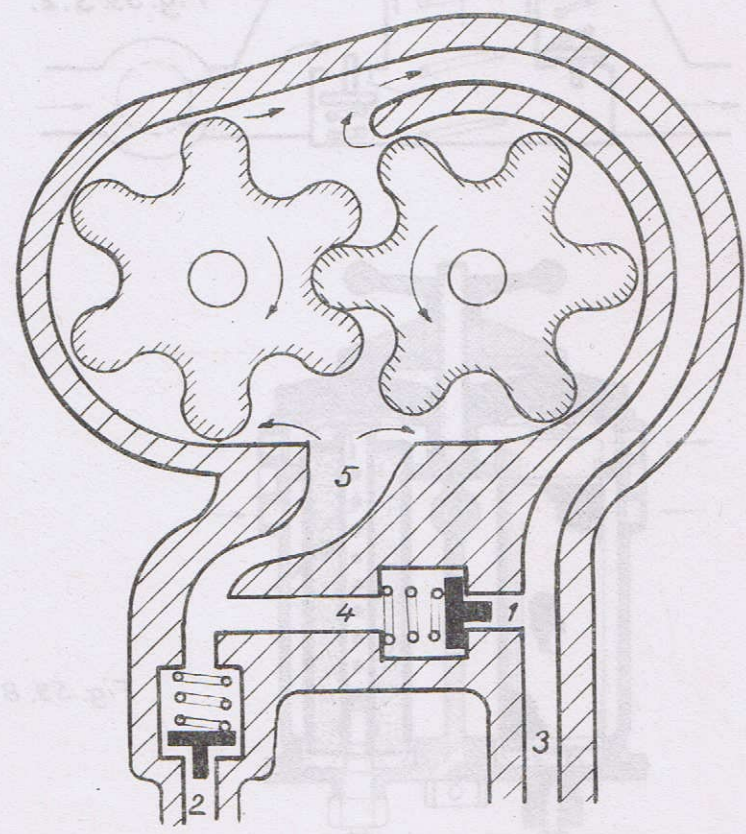


Fig. 59.2.1.

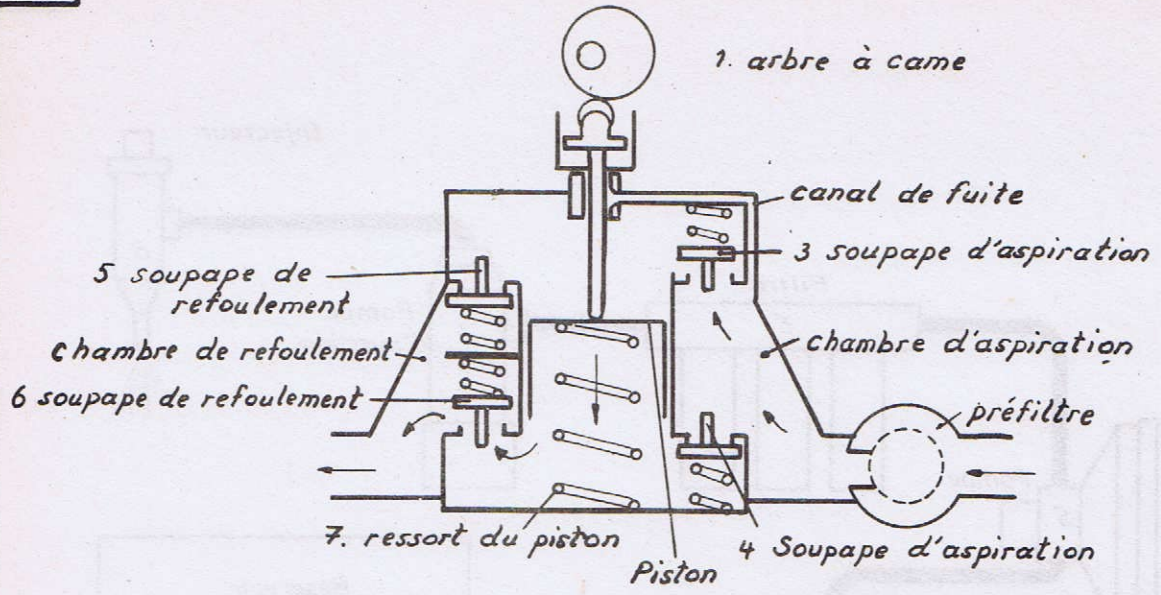


Fig. 59.3.1.

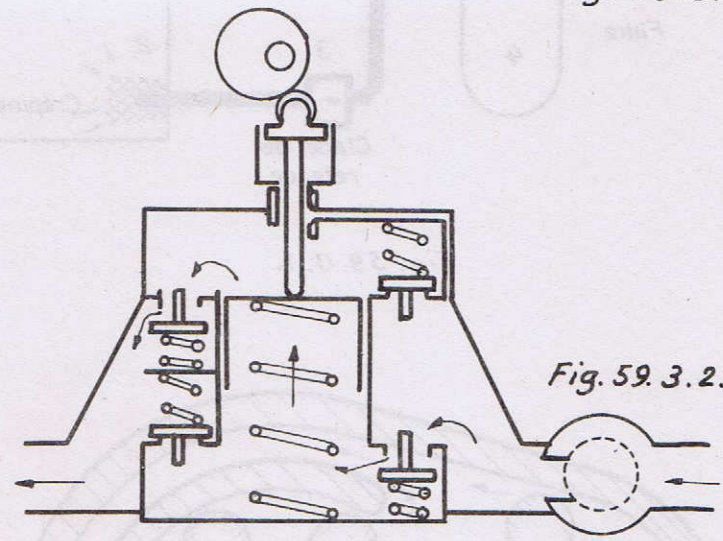


Fig. 59.3.2.

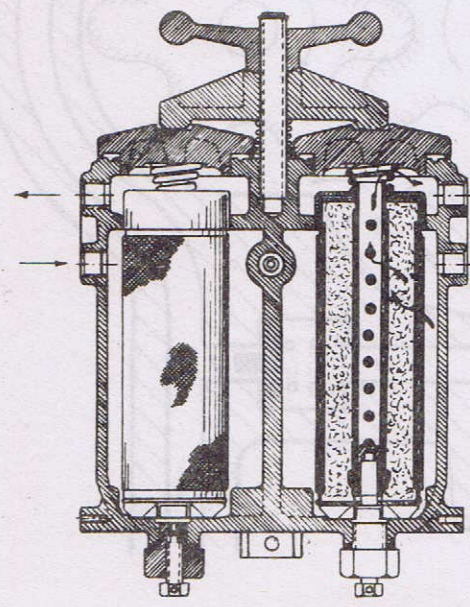


Fig. 59.8.1.

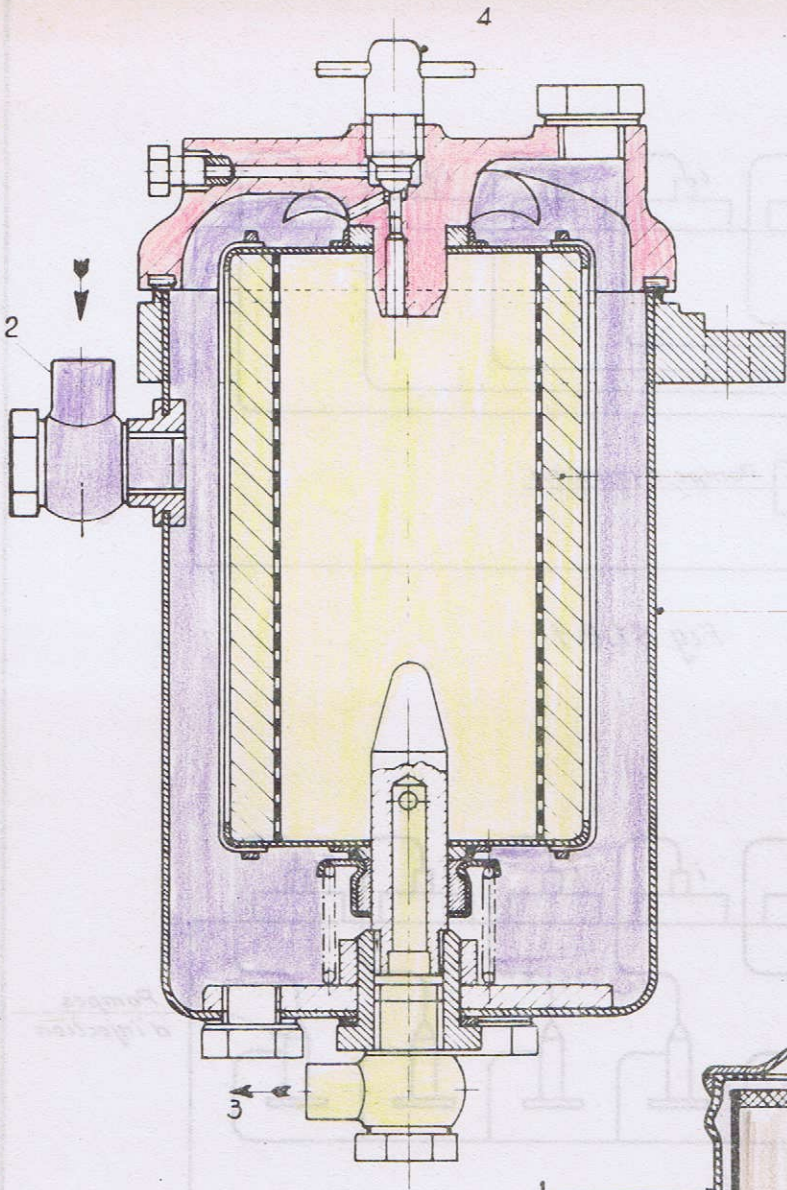
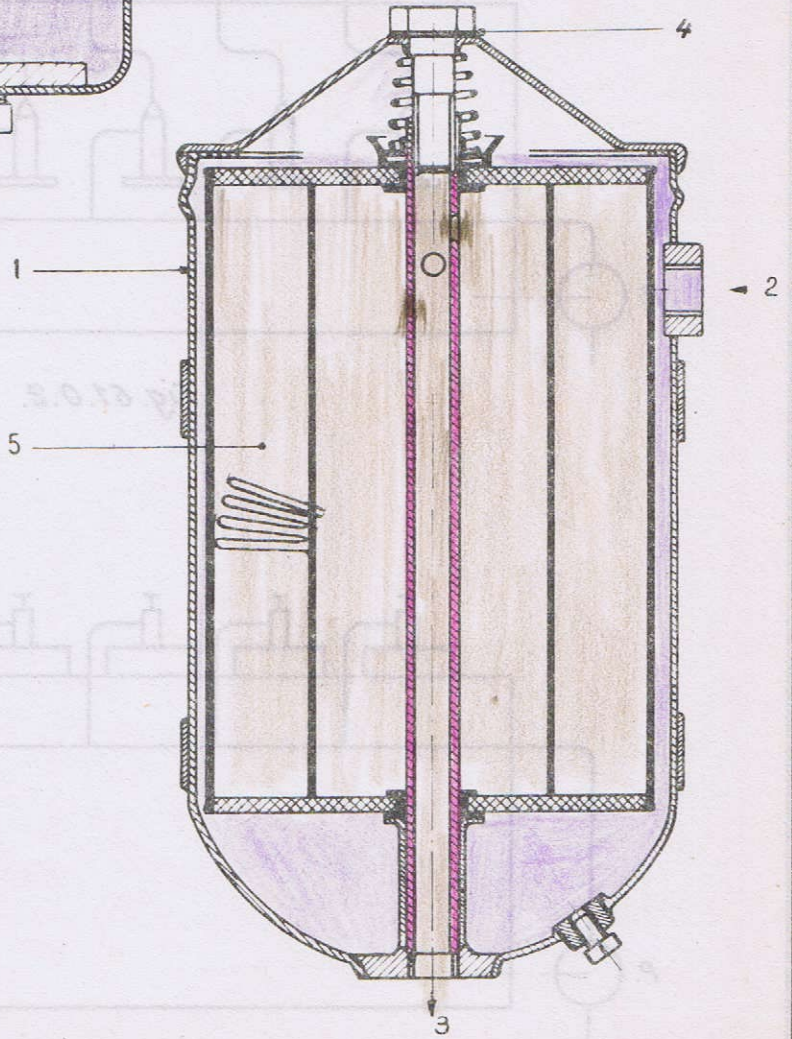


Fig. 59.6.1.

Fig. 59.7.1.



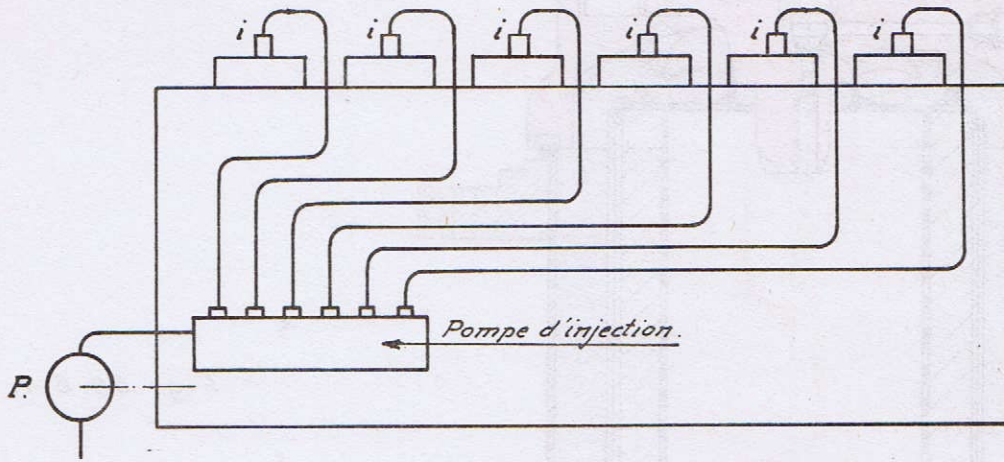


Fig. 61.0.1.

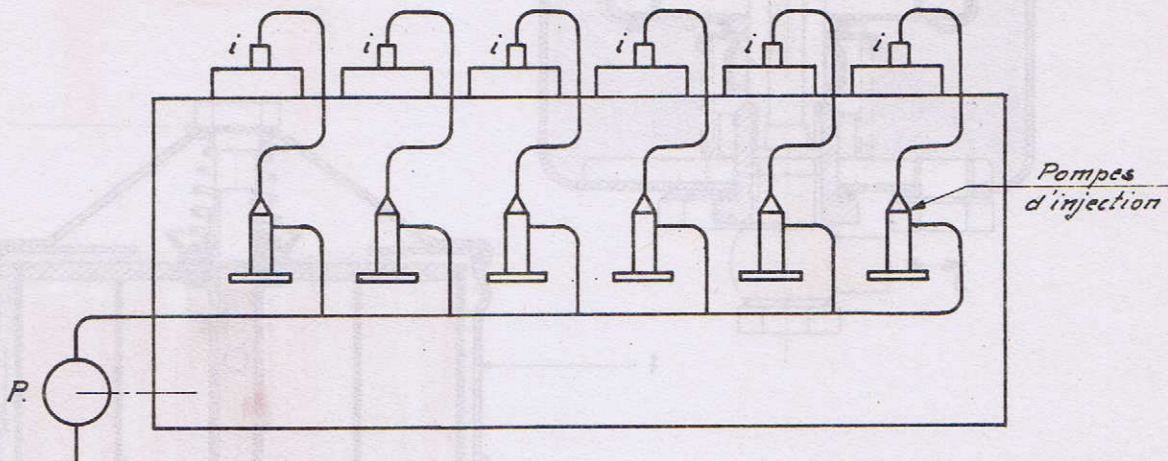


Fig. 61.0.2.

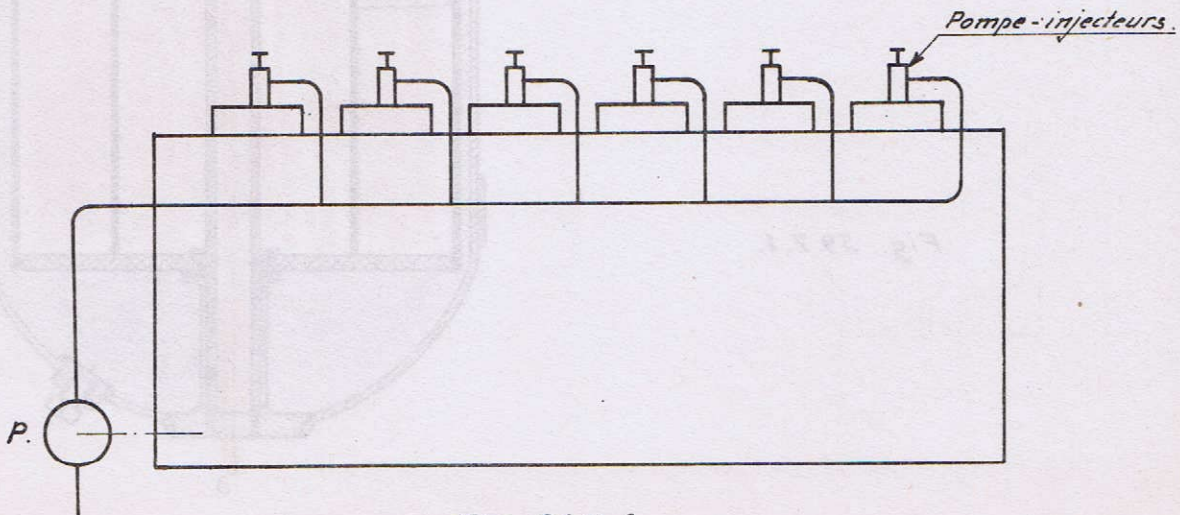


Fig. 61.0.3.

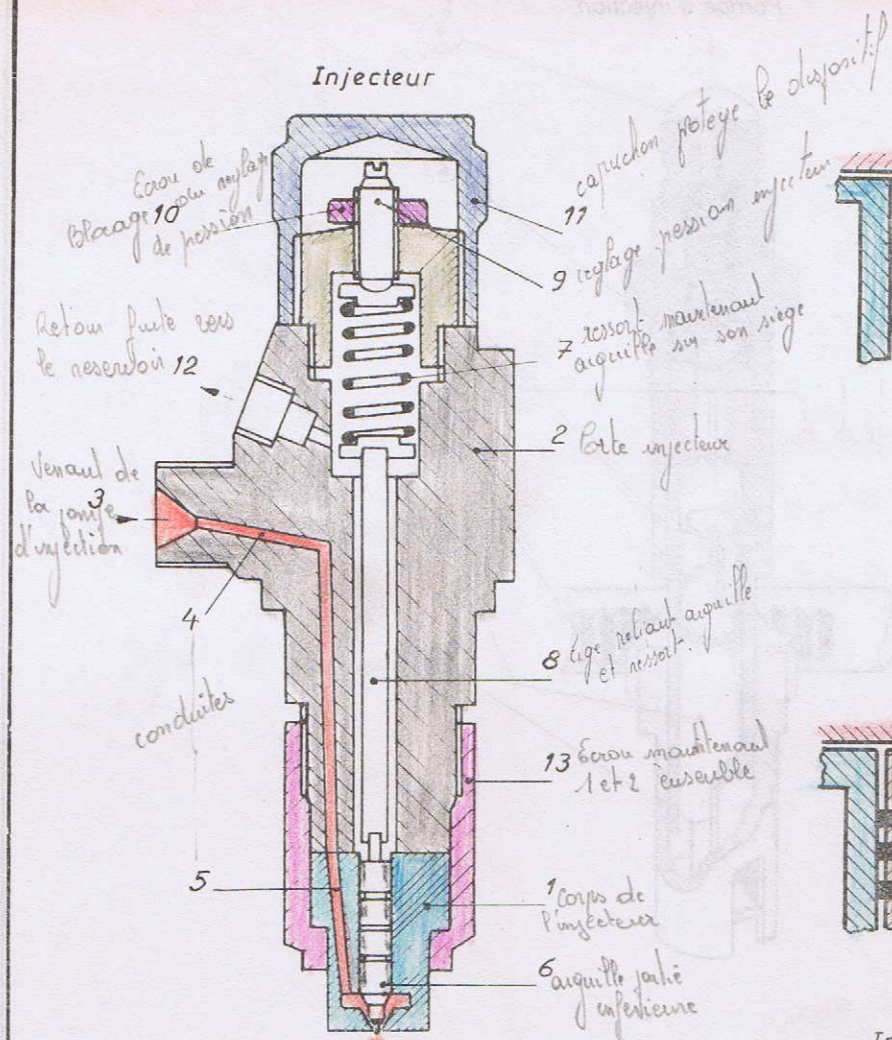


Fig. 61.3.1

Injection directe

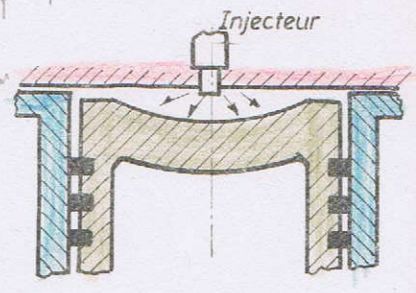


Fig. 61.1.1.

Injection indirecte

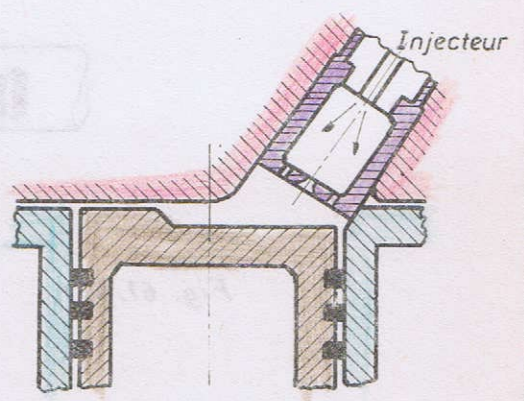


Fig. 61.2.1.

Injection avec chambre de turbulence

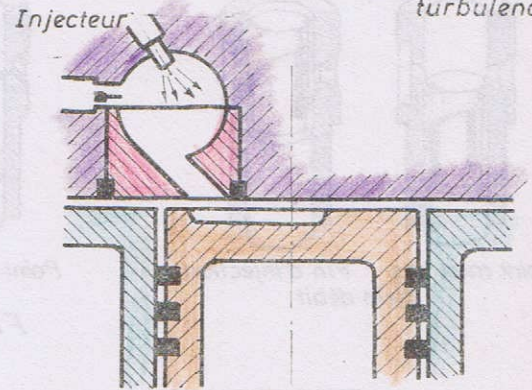
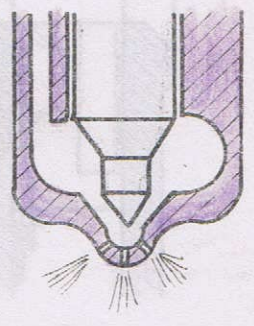
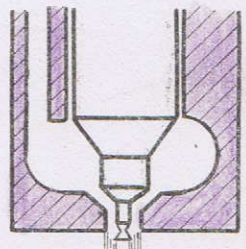
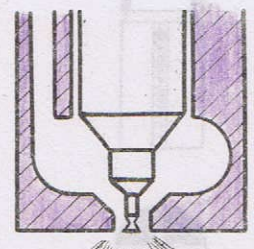
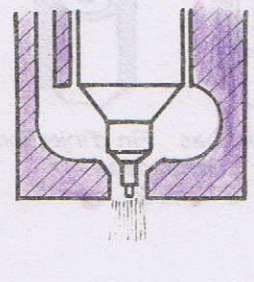
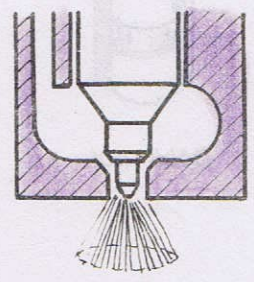


Fig. 61.2.2.



Complètement ouvert

Peu ouvert

Fig. 61.3.2.

Pompe d'injection

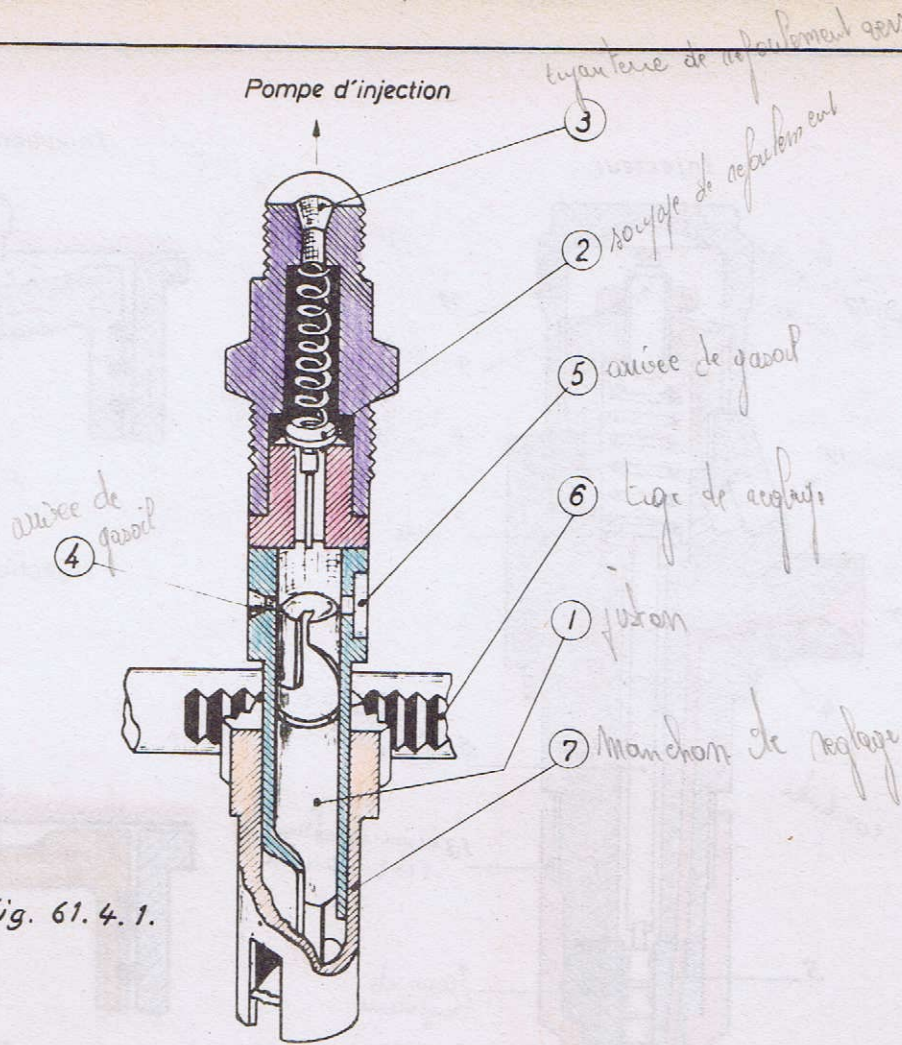


Fig. 61.4.1.

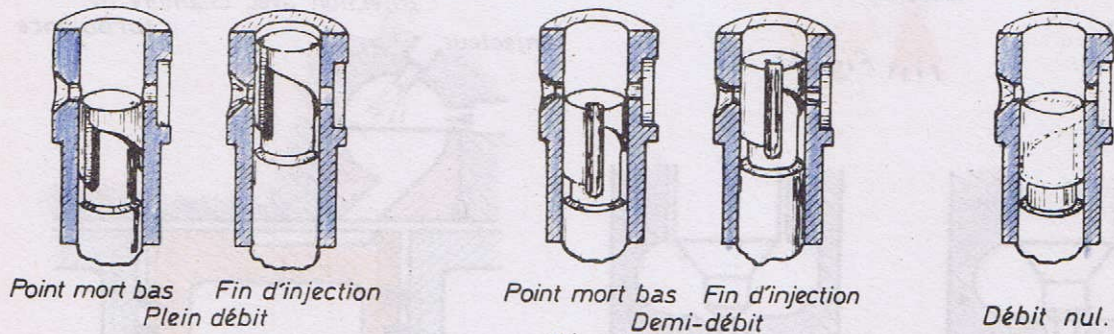


Fig. 61.4.2.



Fig. 64.4.3.

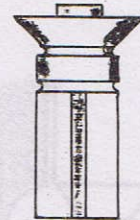


Fig. 64.4.4.

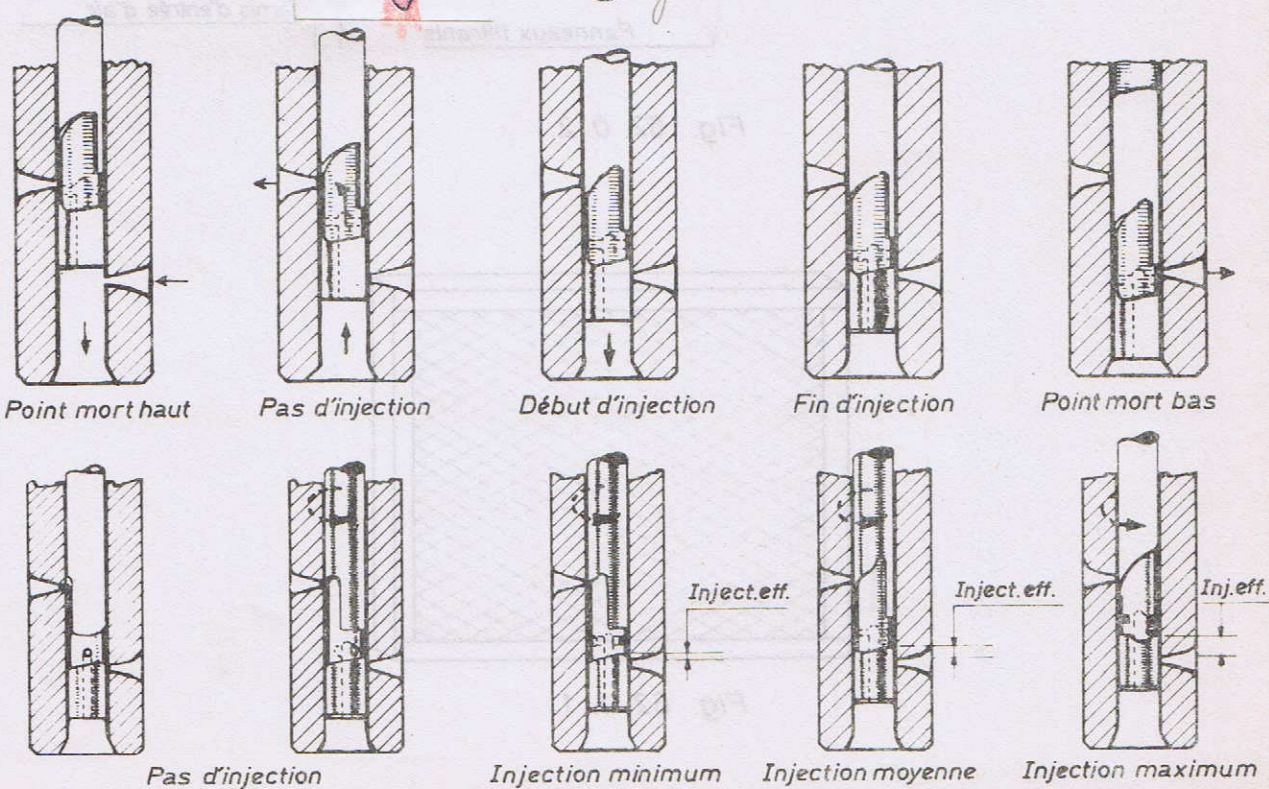
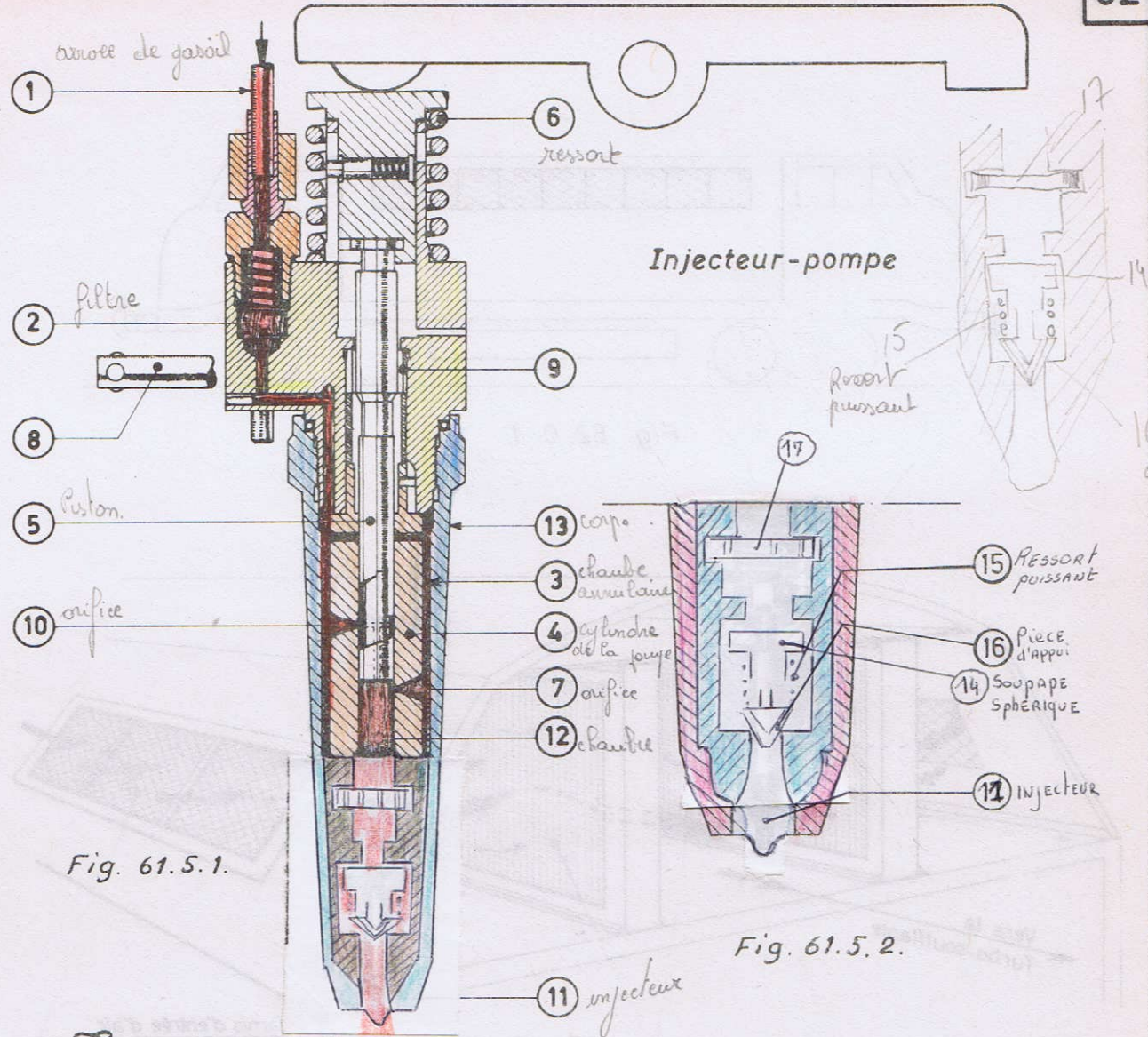


Fig. 61.5.3.

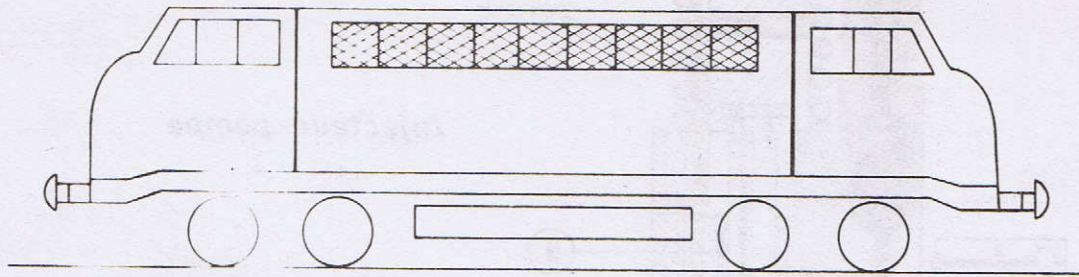


Fig. 62.0.1.

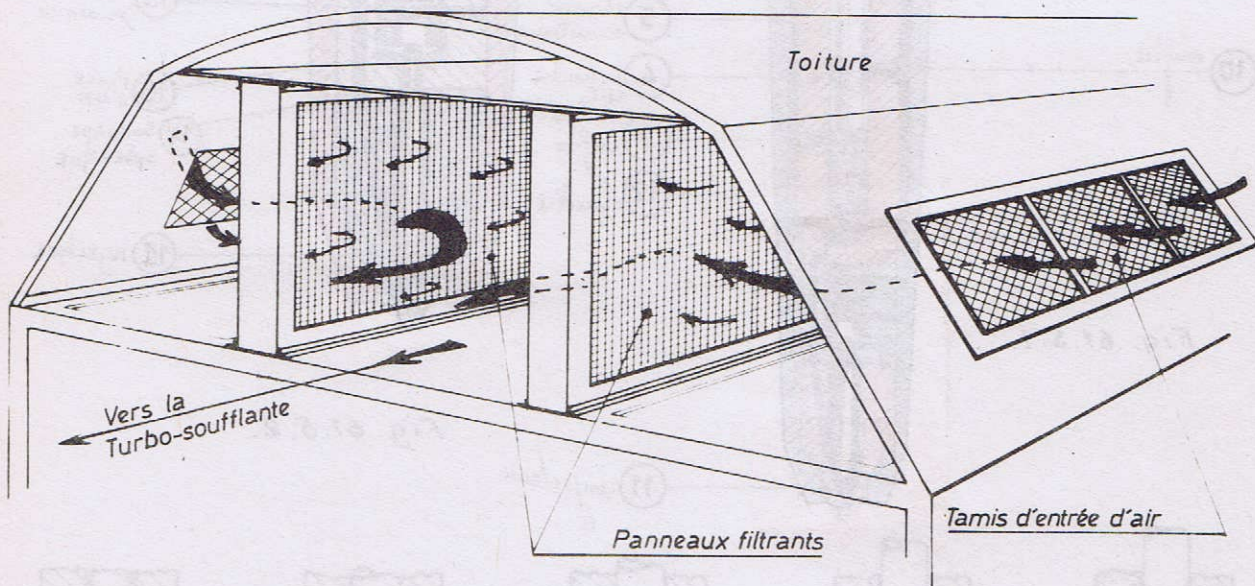


Fig. 62.0.2.

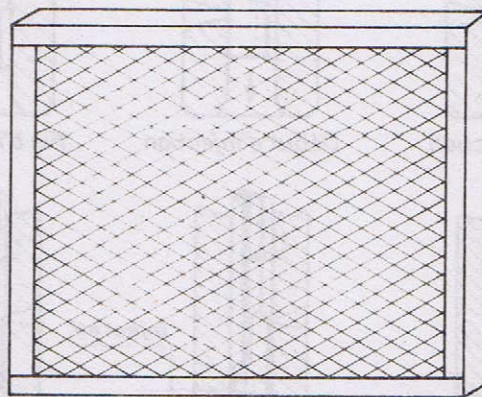


Fig. 62.1.1.

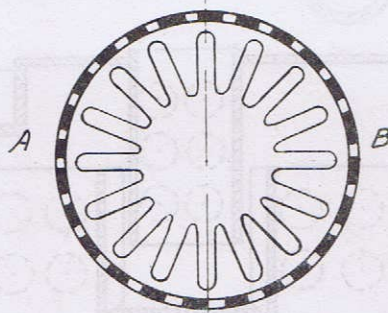
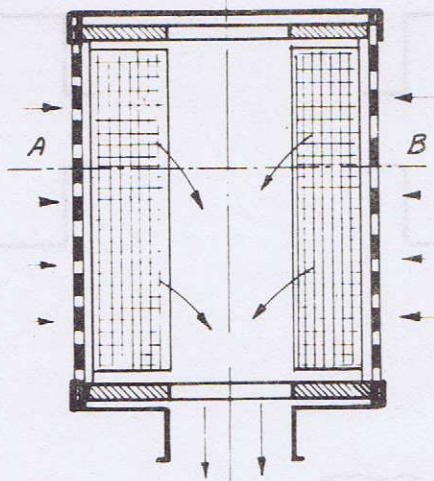


Fig. 62.2.1.

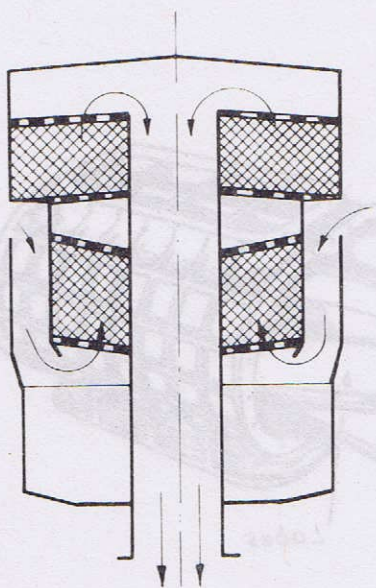


Fig. 62.3.1.

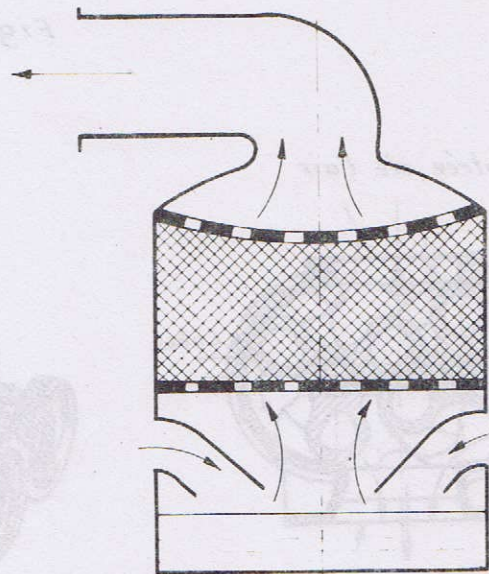


Fig. 62.3.2.

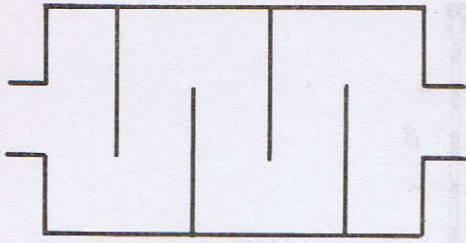


Fig. 63.1.1.

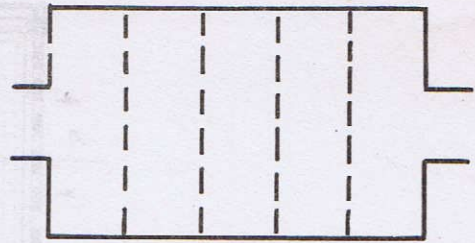


Fig. 63.1.2.

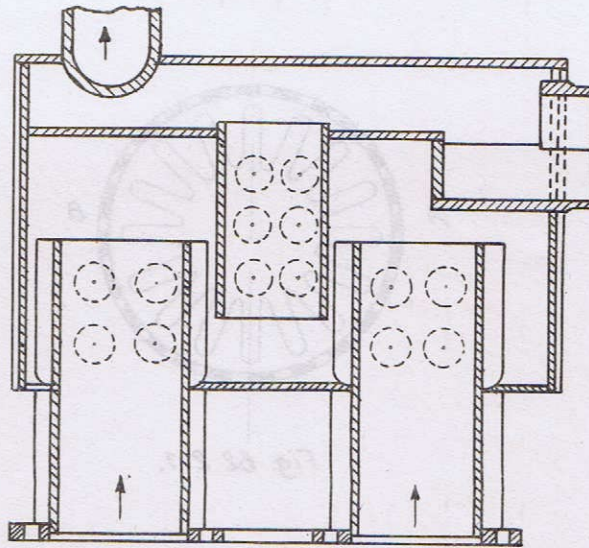


Fig. 63.1.3.

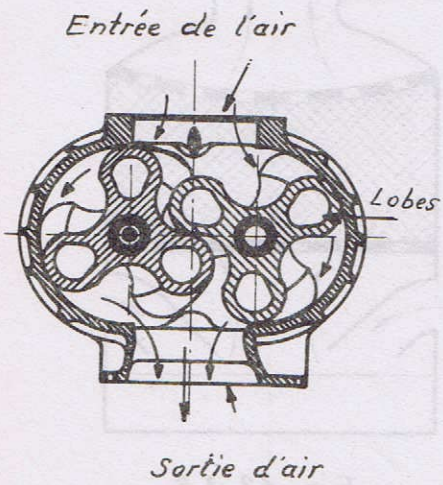


Fig. 63.4.1.

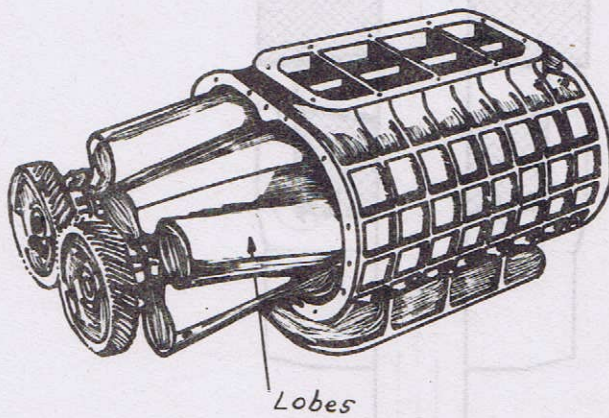


Fig. 63.4.2.

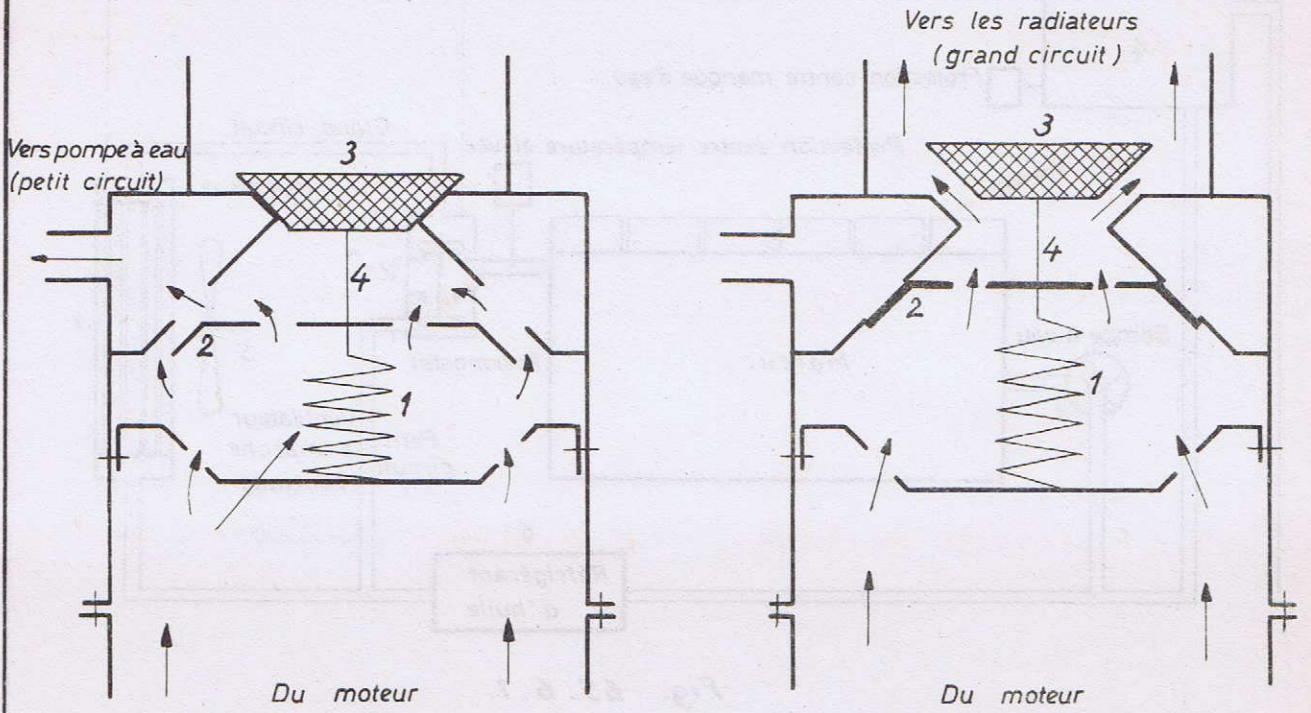


Fig. 65.4.1.

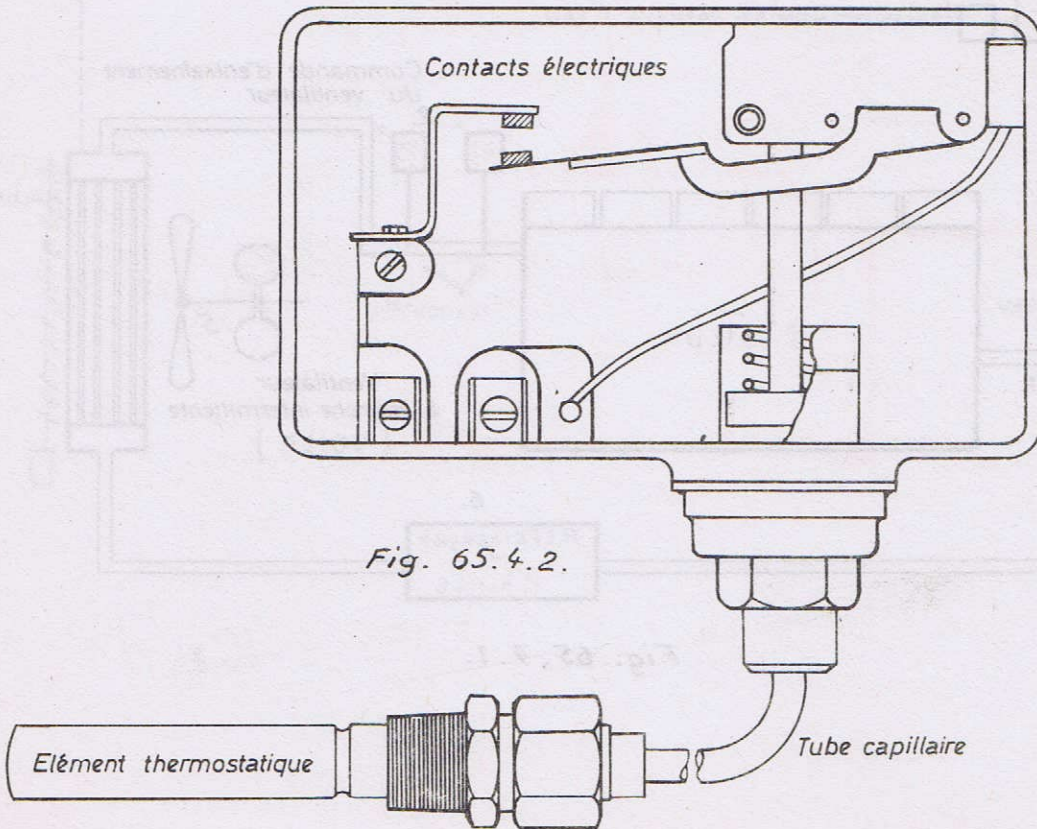


Fig. 65.4.2.

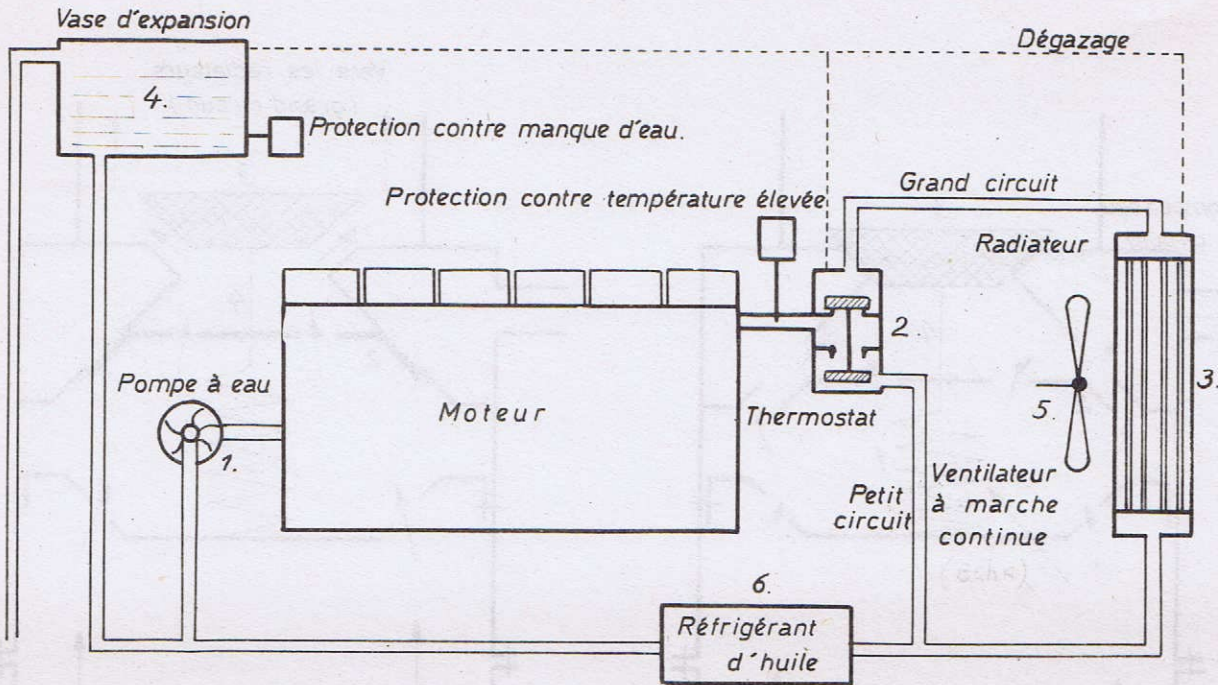


Fig. 65.6.1.

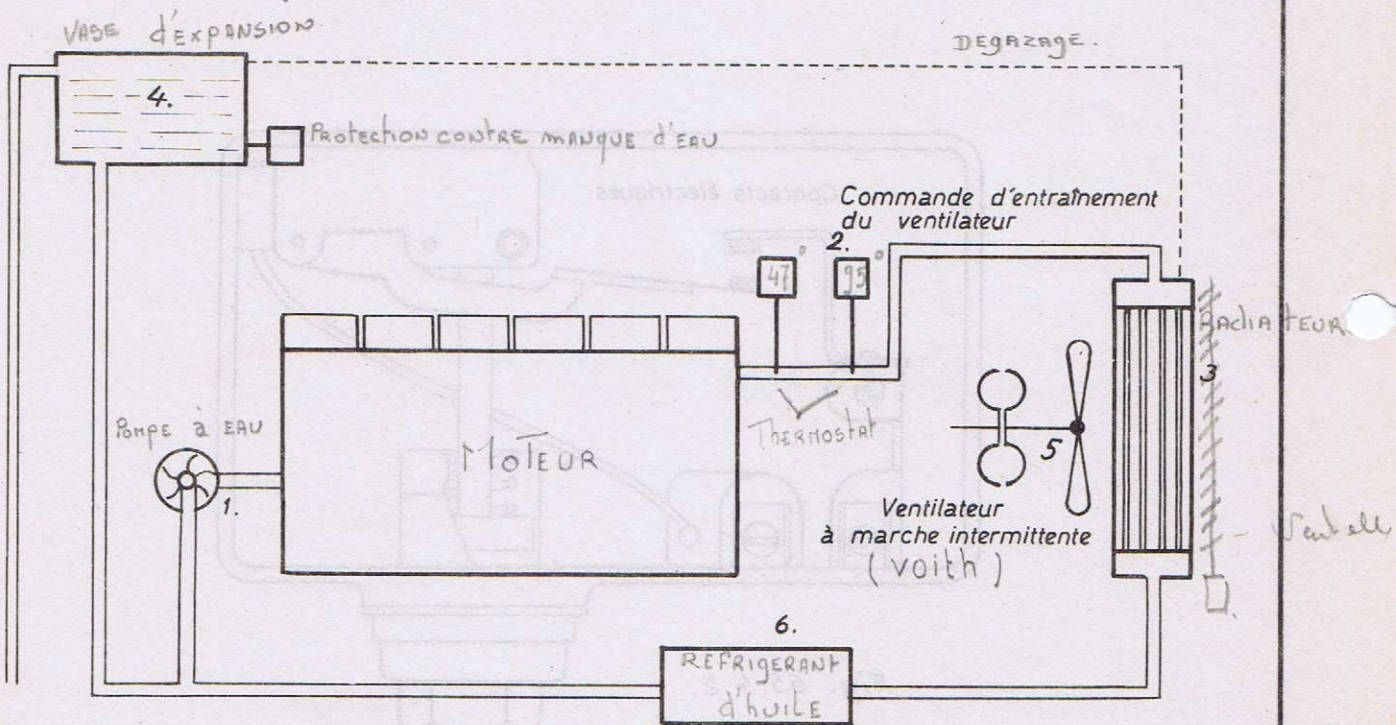
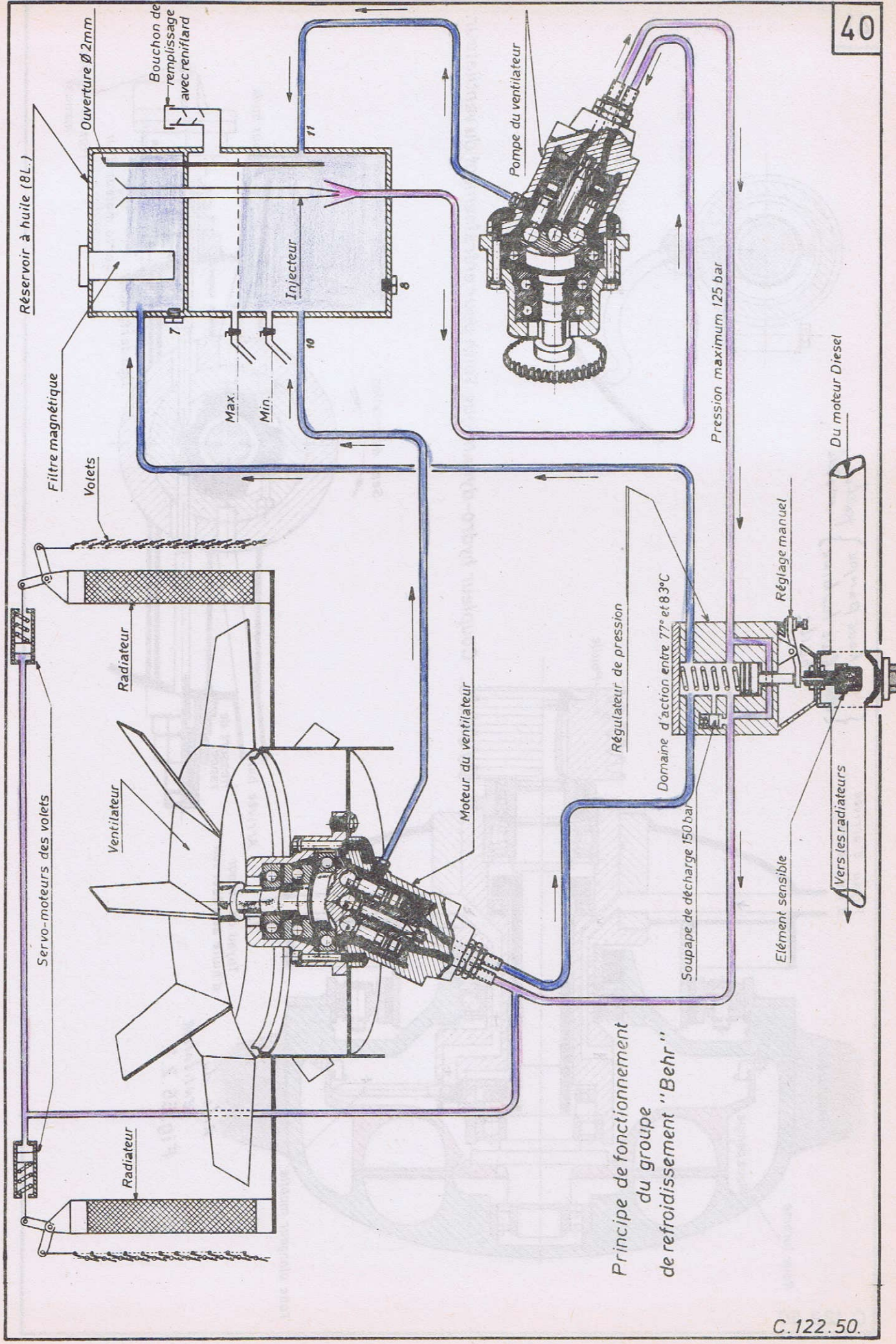


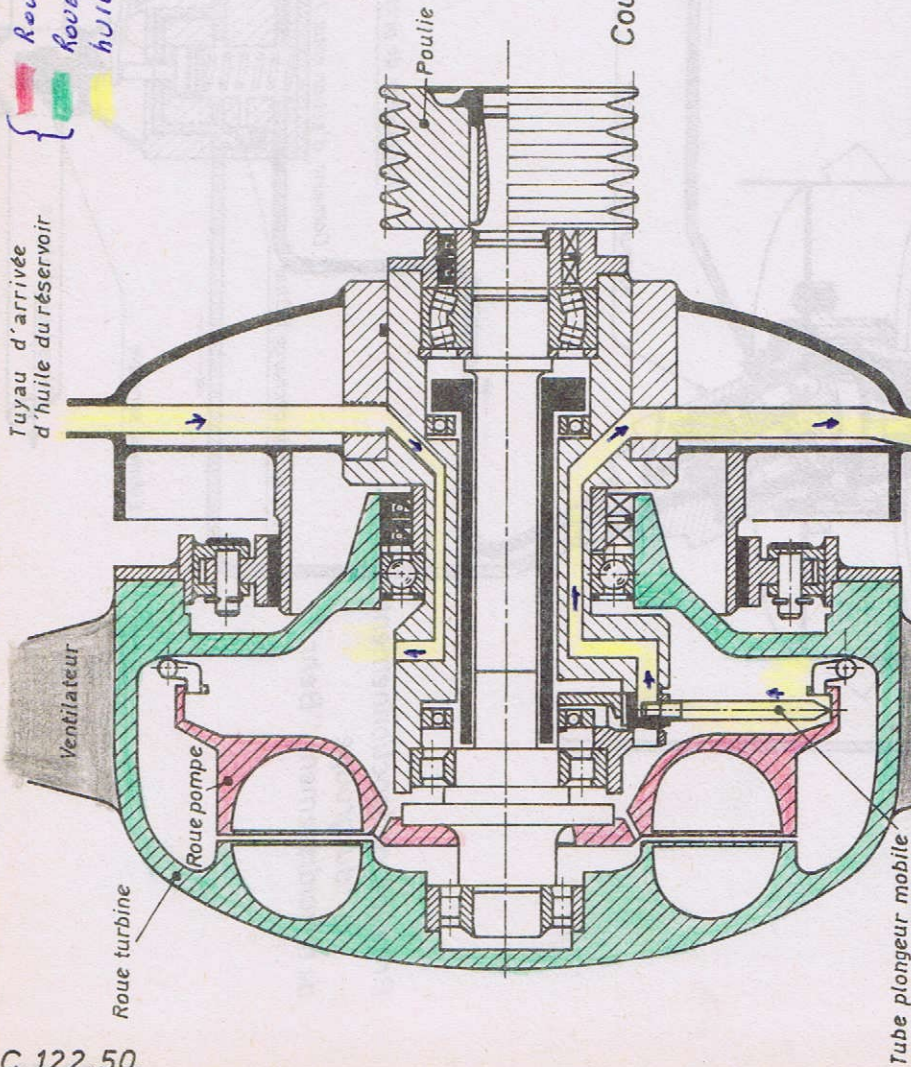
Fig. 65.7.1.

66.0.1

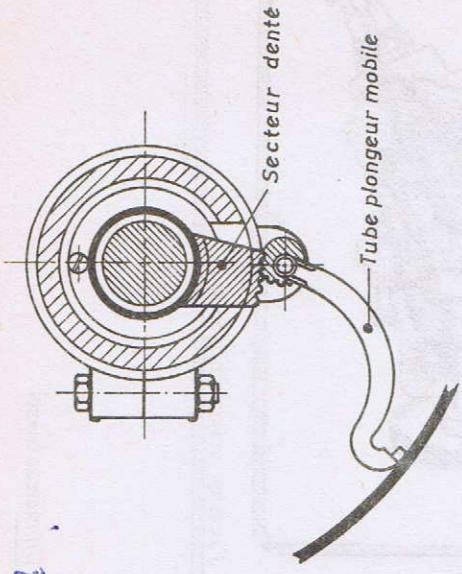


Principe de fonctionnement du groupe de refroidissement "Behr"

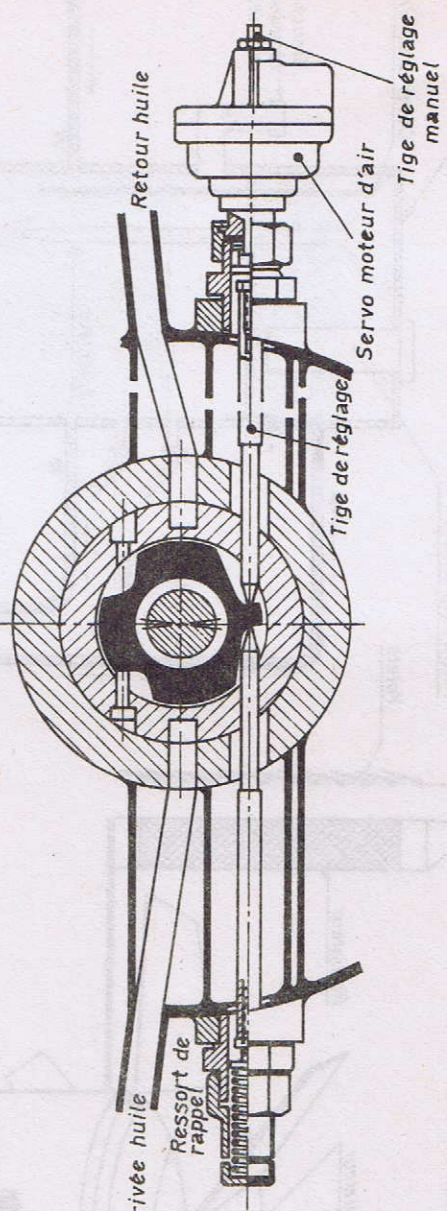
█ Roue pompe
█ Roue turbine
█ HUILE



Coupleur hydro-dynamique Voith pour entraînement du ventilateur.



Sens de rotation



Aile du Ventilateur.
Fig. 66.2.1.

Fig. 69.5.1

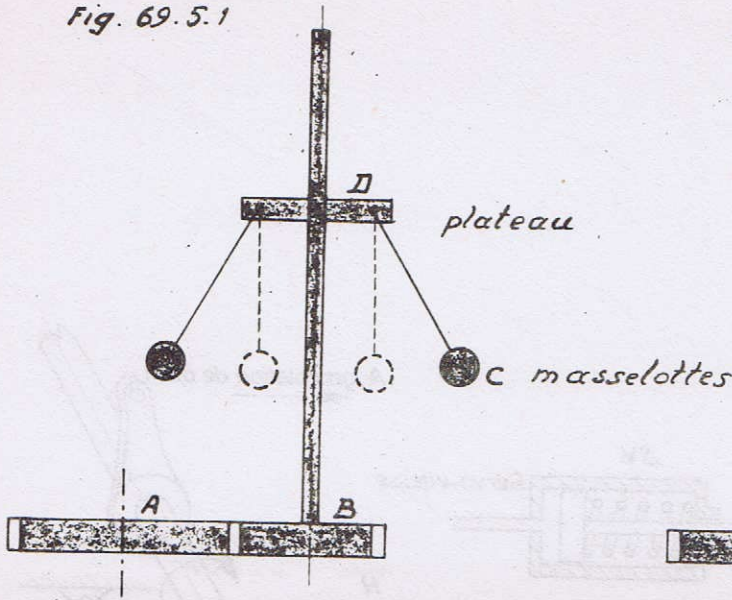


Fig. 69.5.2.

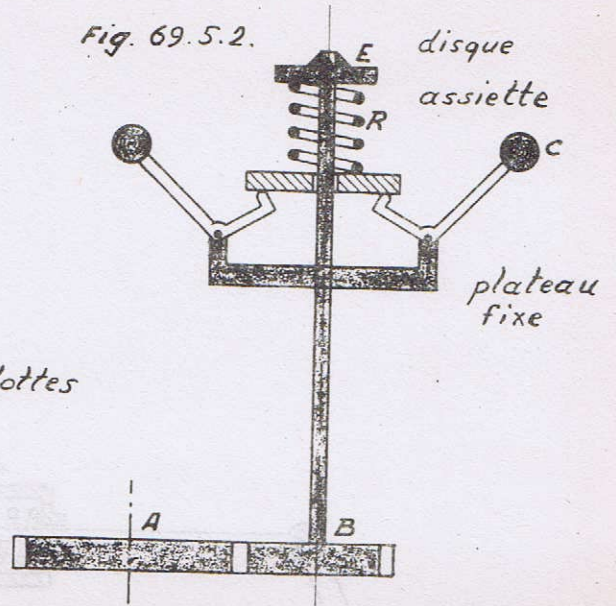


Fig. 69.5.3

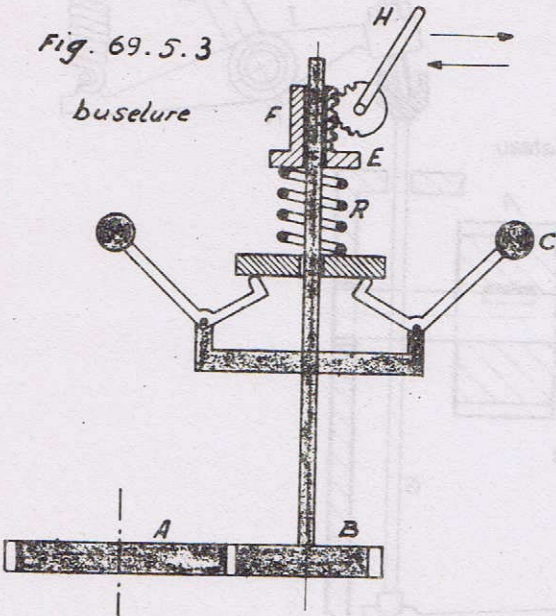


Fig. 69.5.4

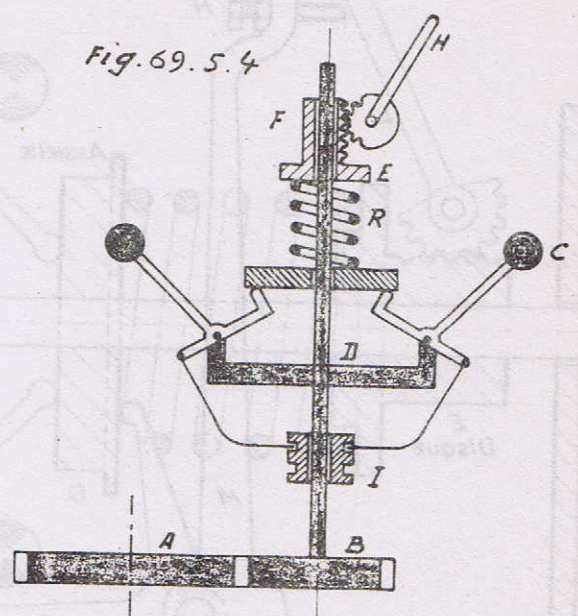


Fig. 69.5.5

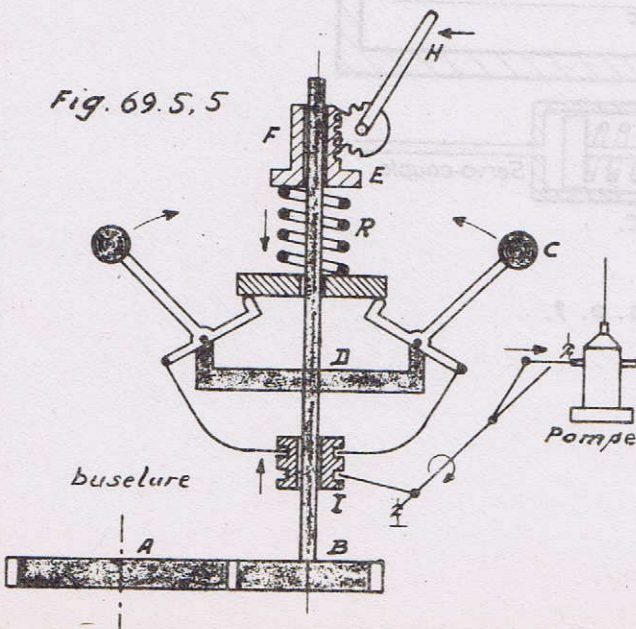
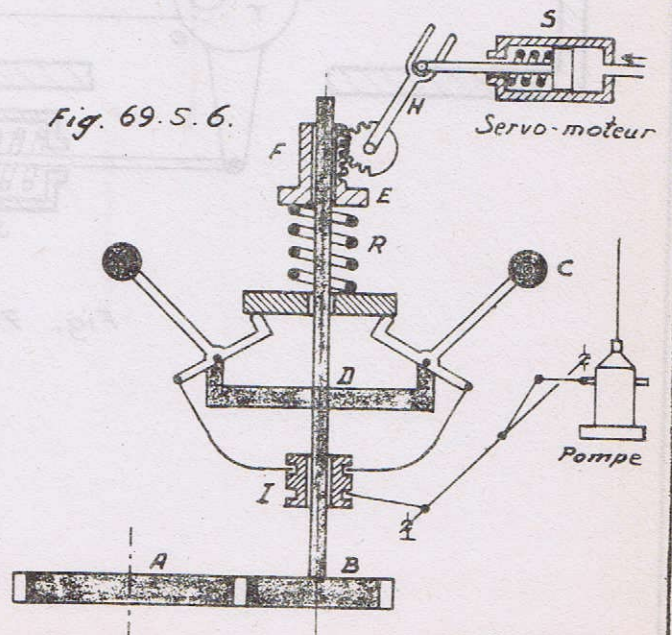


Fig. 69.5.6.



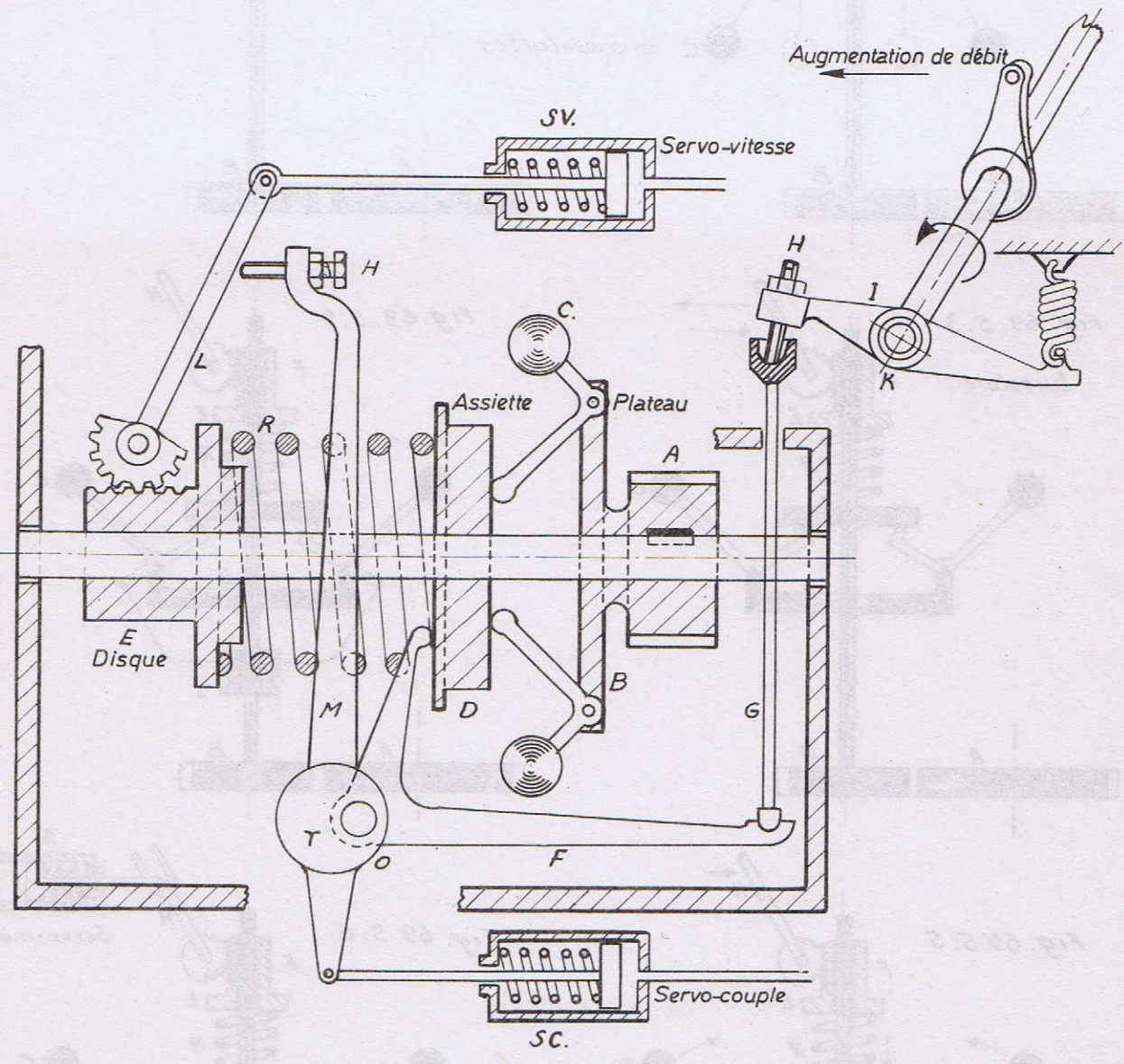
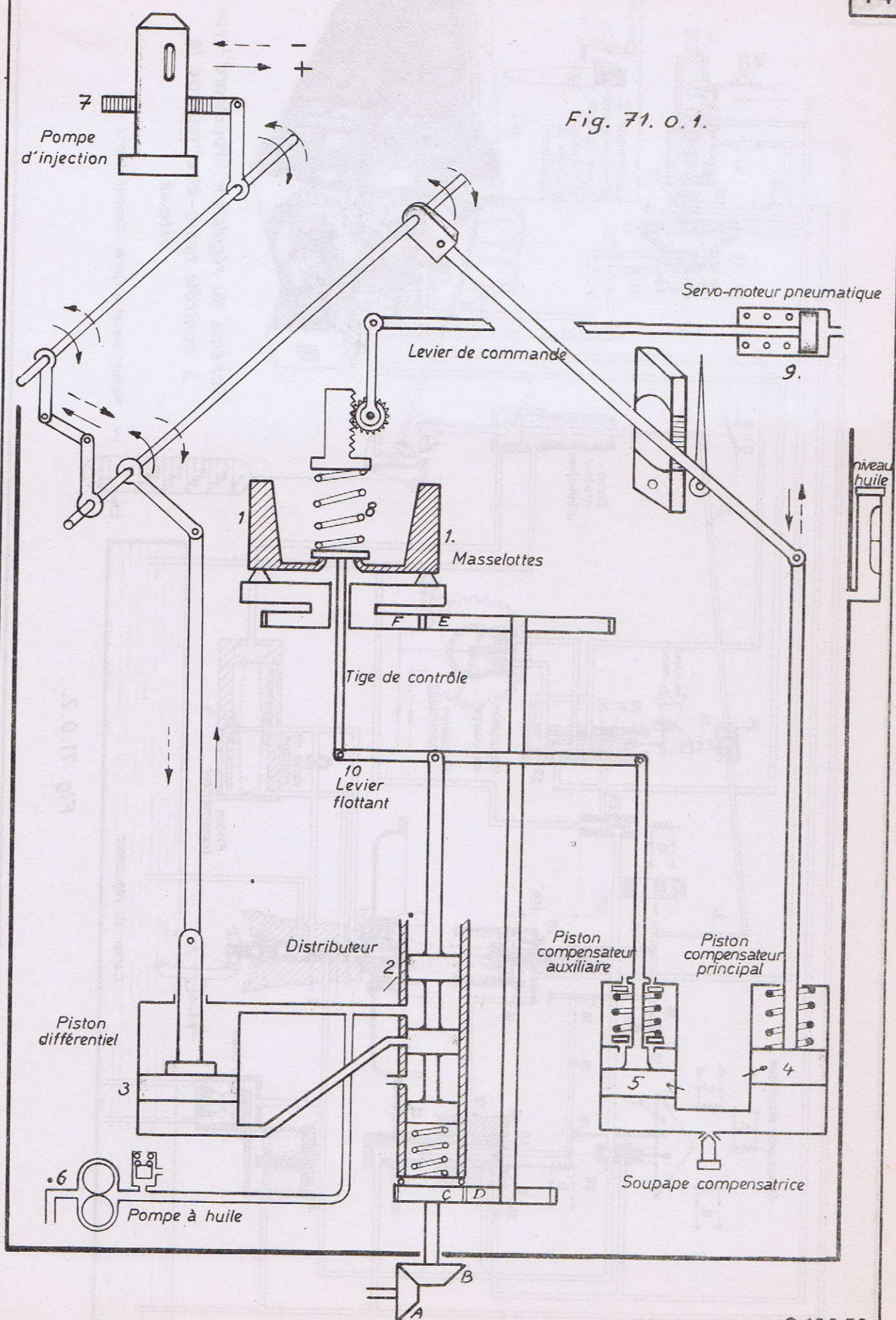


Fig. 70.0.1.

Fig. 71. 0. 1.



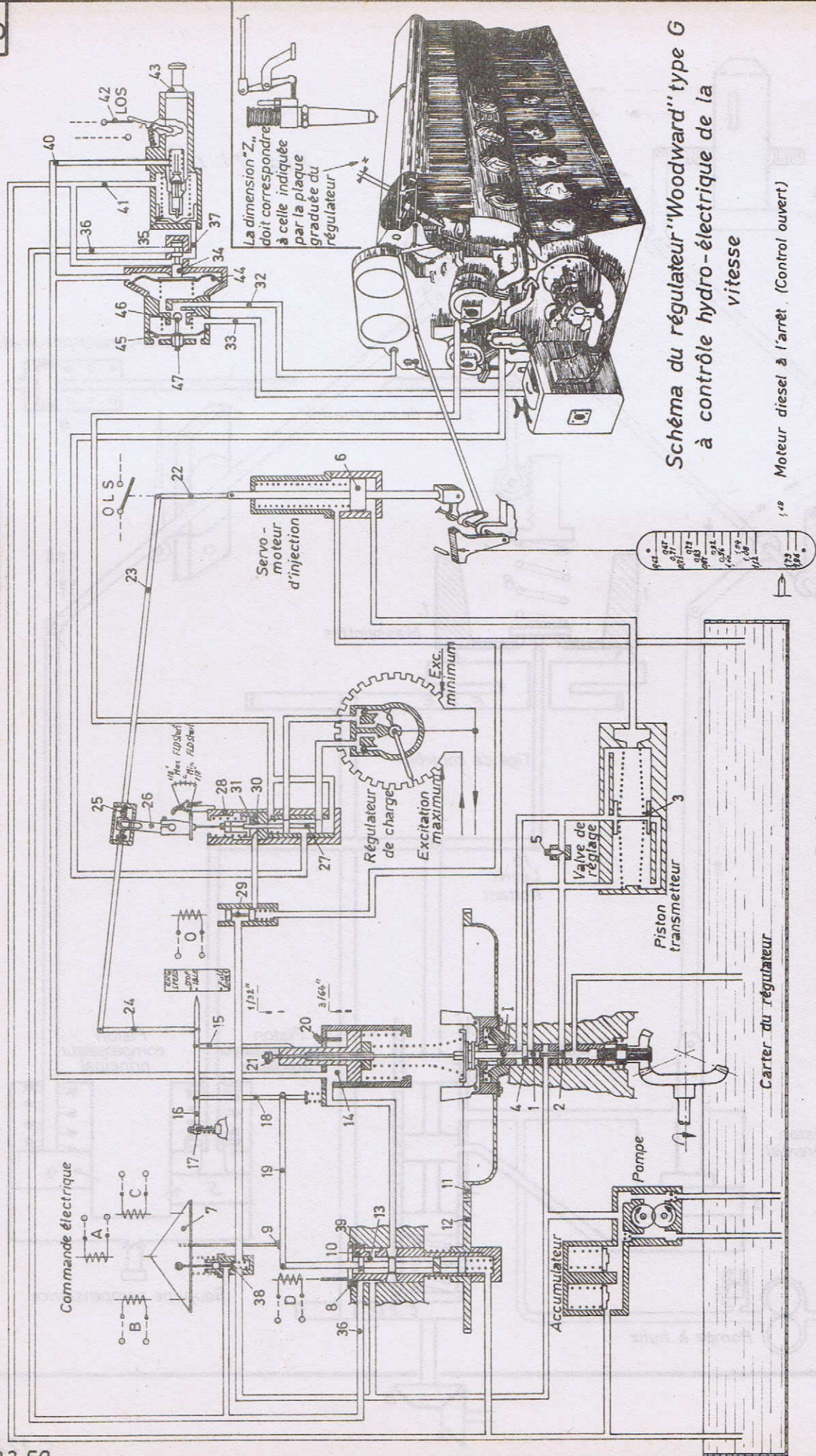


Schéma du régulateur "Woodward" type G
à contrôle hydro-électrique de la
vitesse

Moteur diesel à l'arrêt. (Control ouvert)

Fig. 71.0.2.

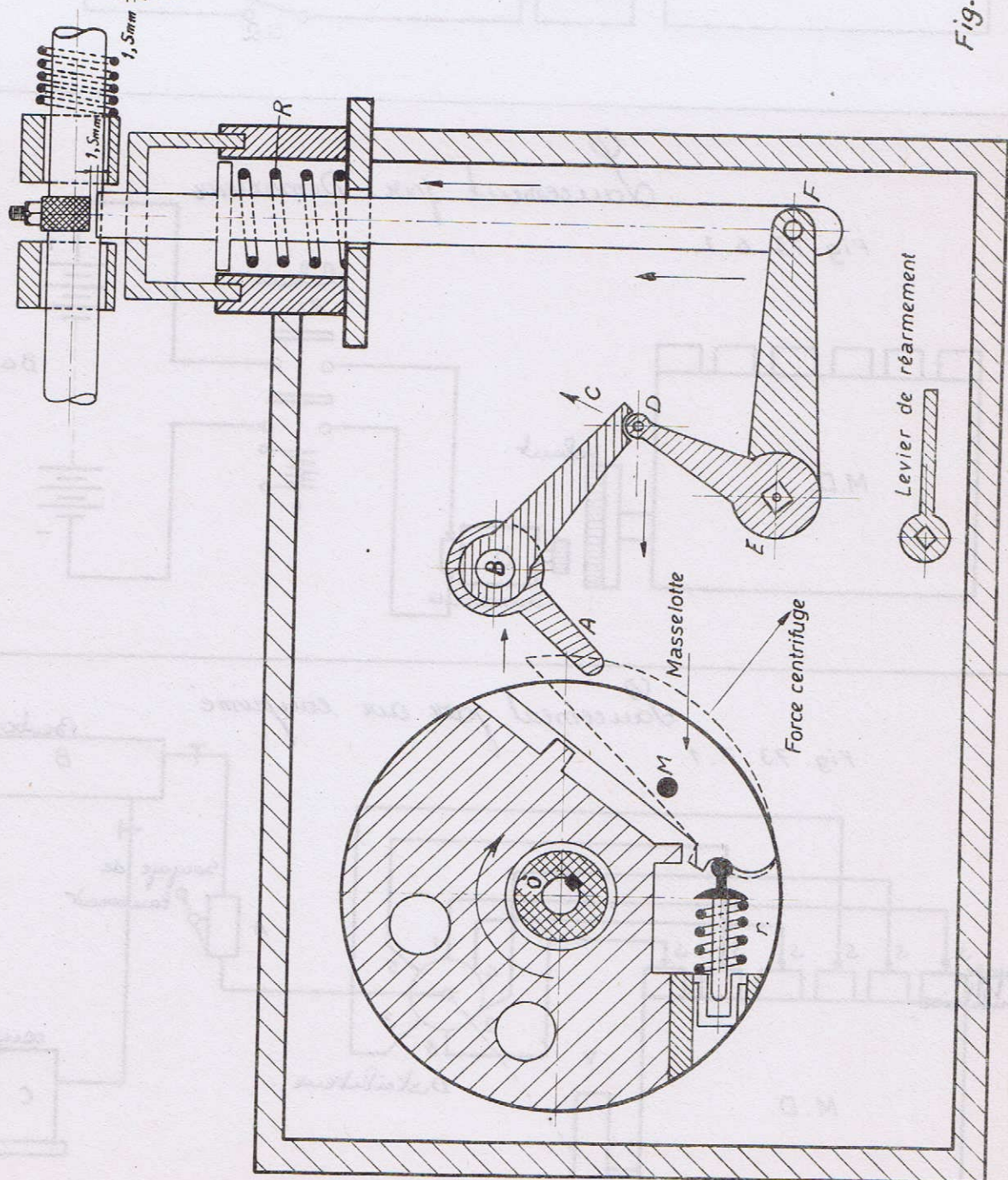
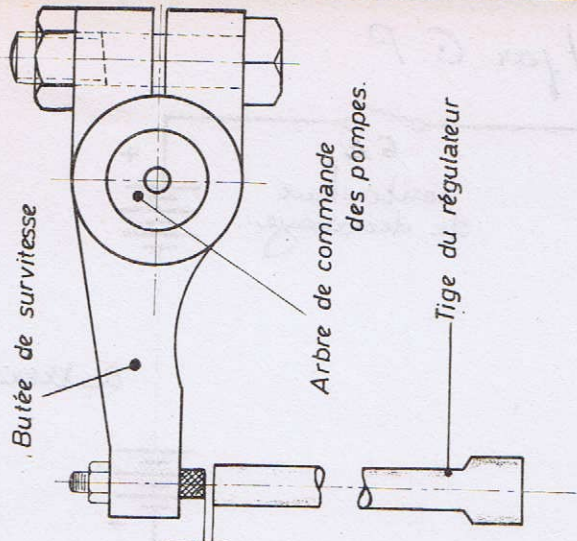
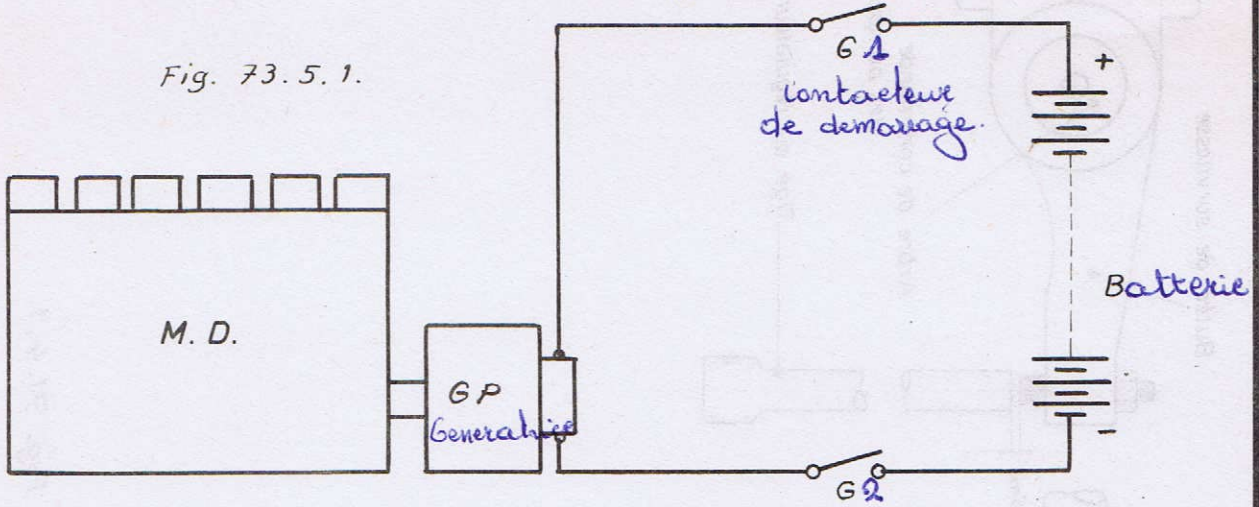


Fig. 71.4.1.

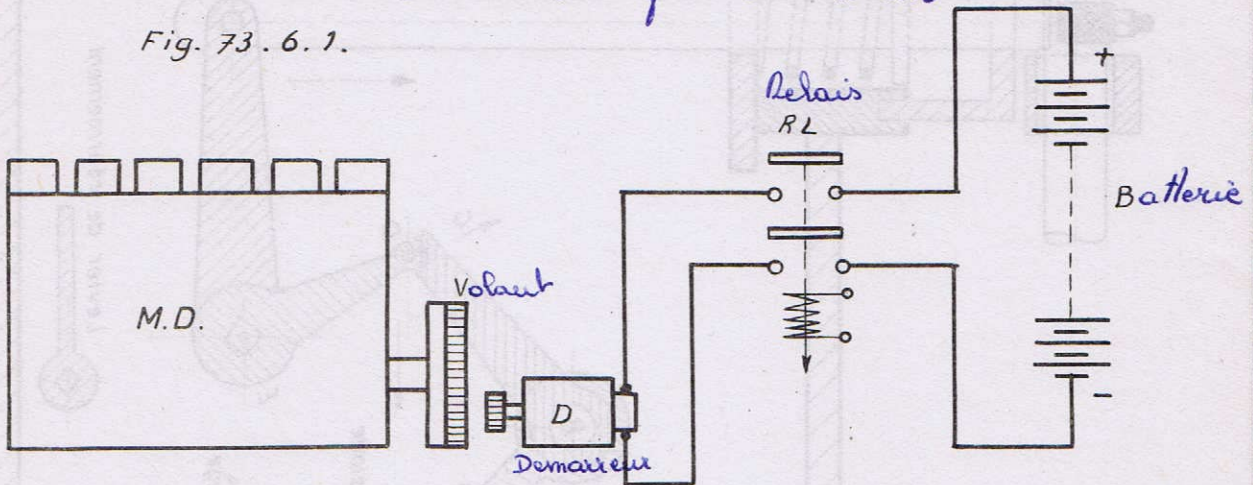
Lancement par G.P

Fig. 73.5.1.



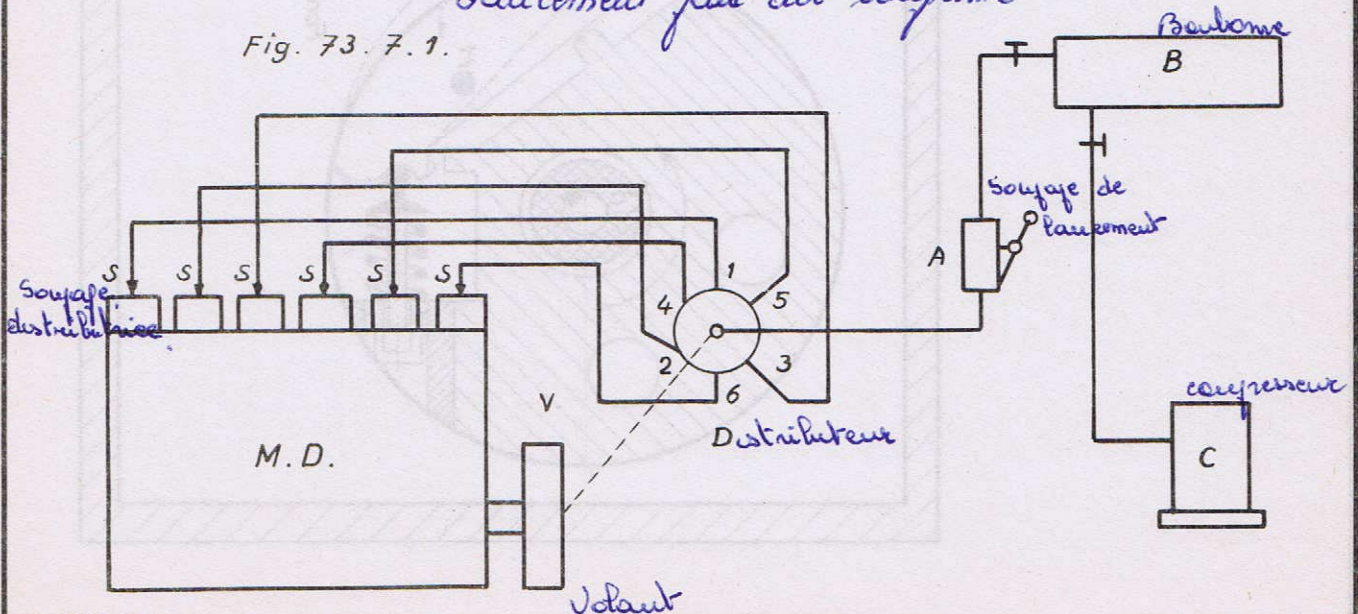
Lancement par Demarreur

Fig. 73.6.1.



Lancement par air comprimé

Fig. 73.7.1.



Lancement avec G.P. en moteur série

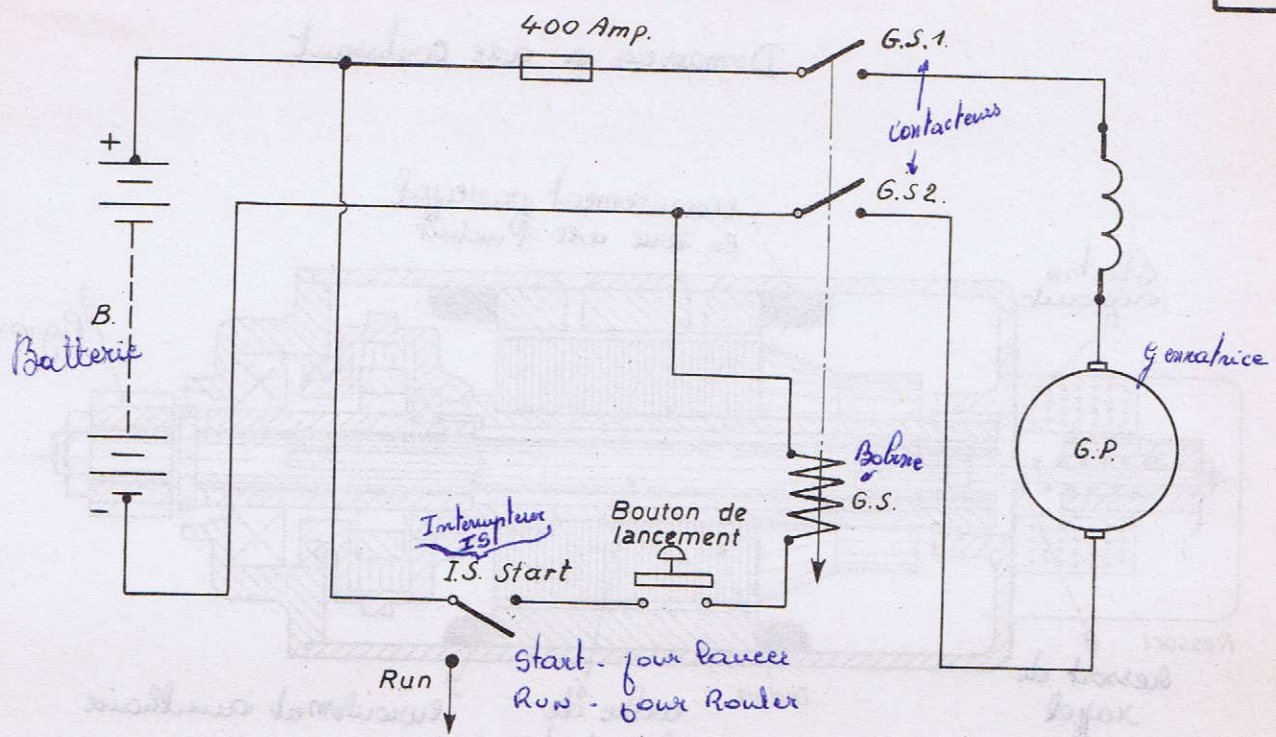


Fig. 74. 1.1.

Lancement avec G. P. en moteur shunt

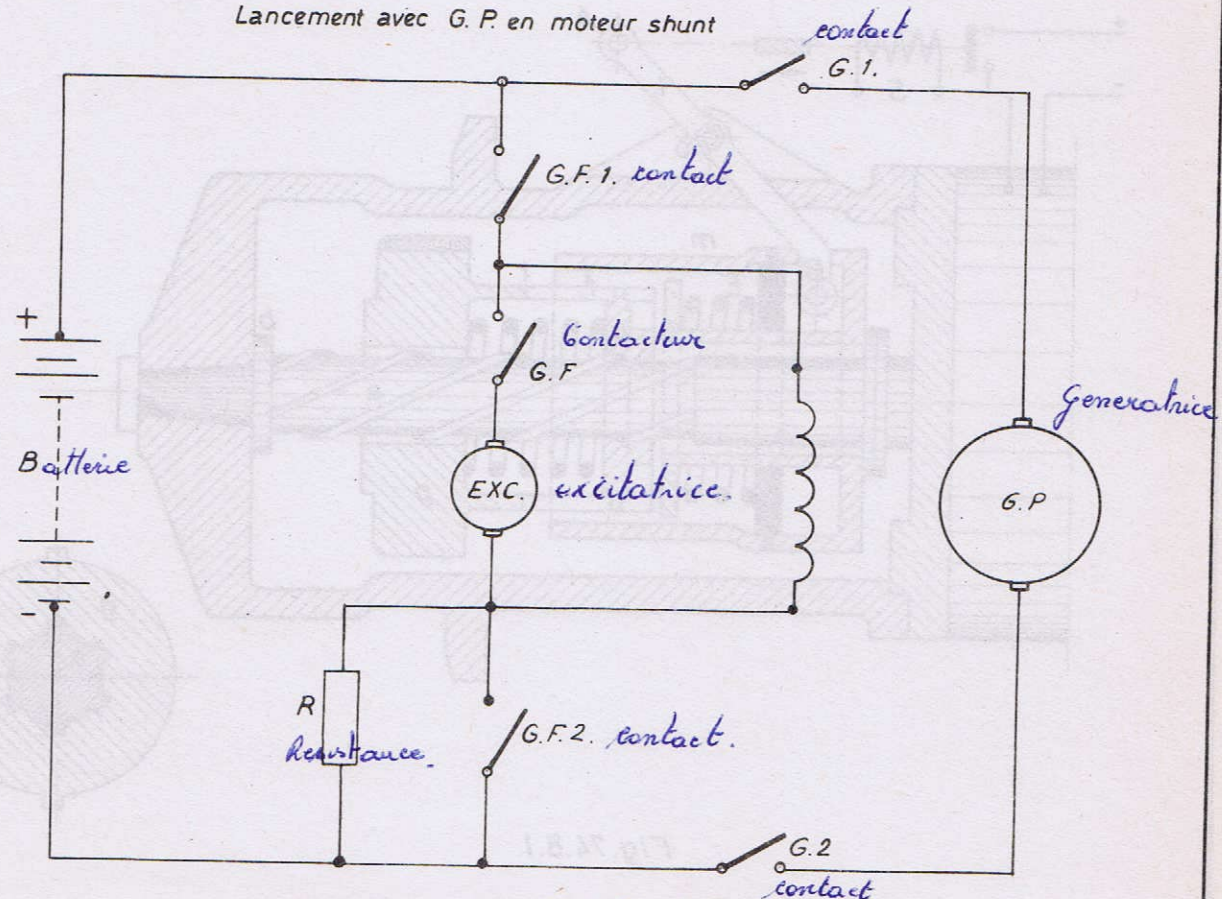


Fig. 74. 2.1.

Demarreur a axe coulissant

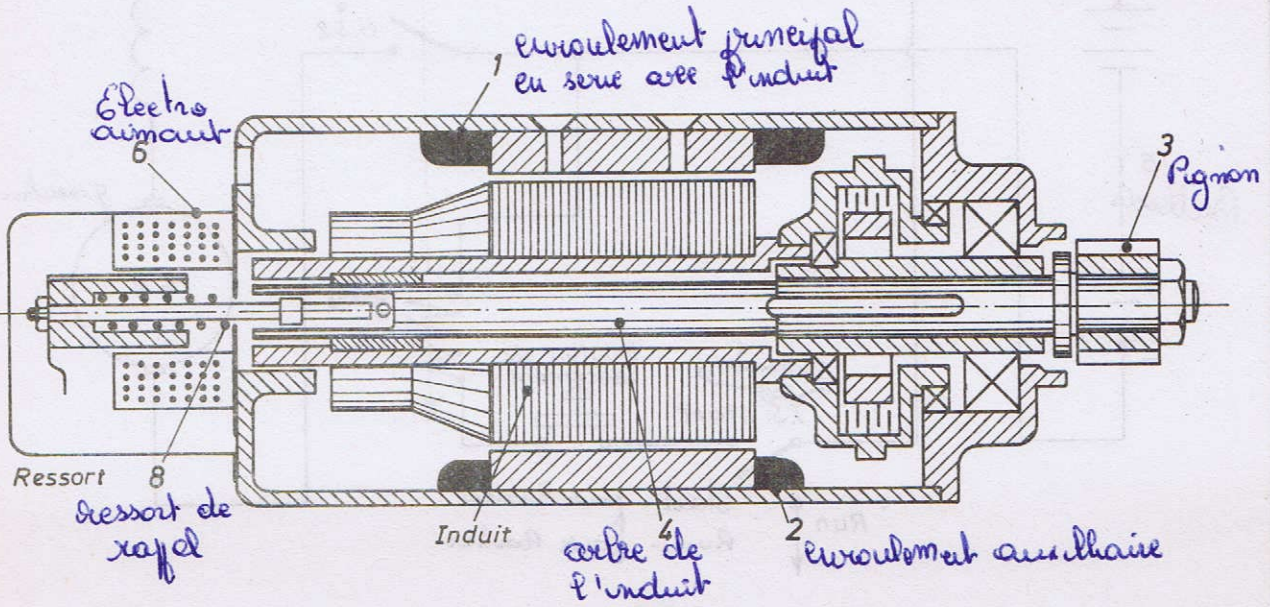


Fig.74.5.1.

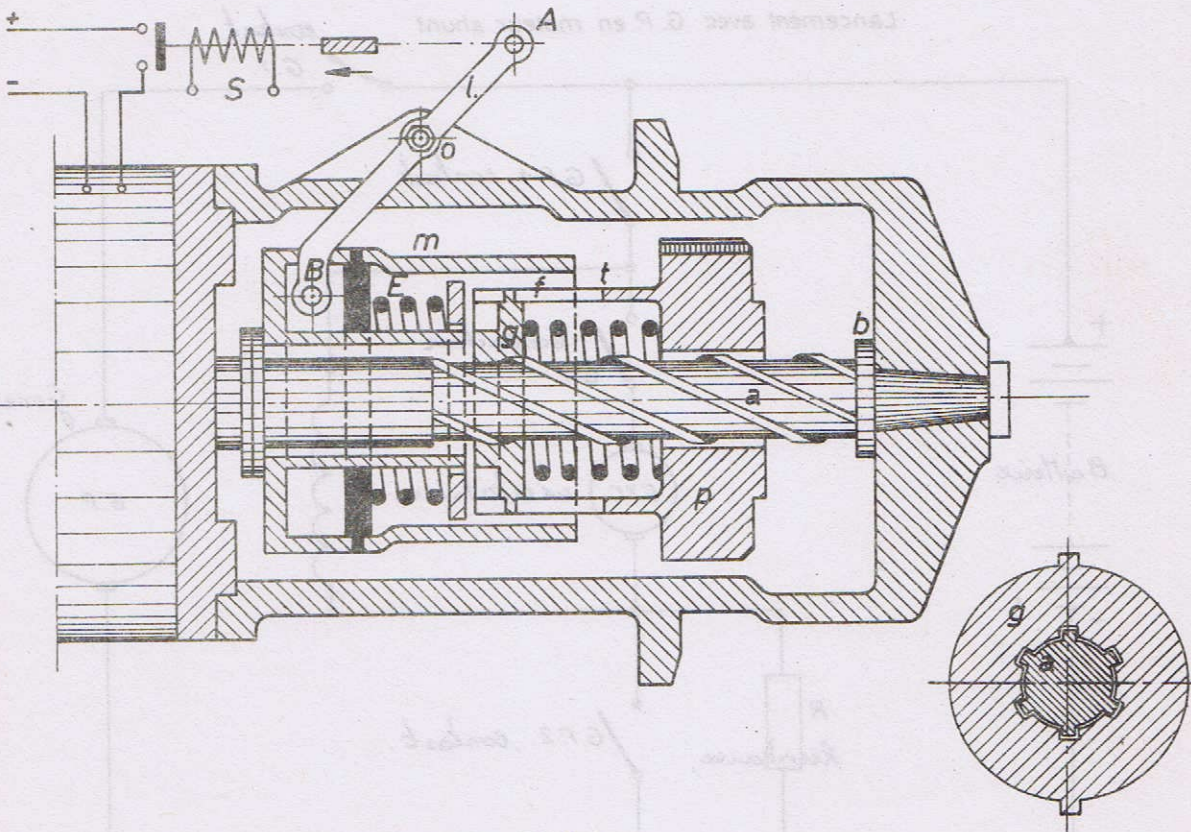
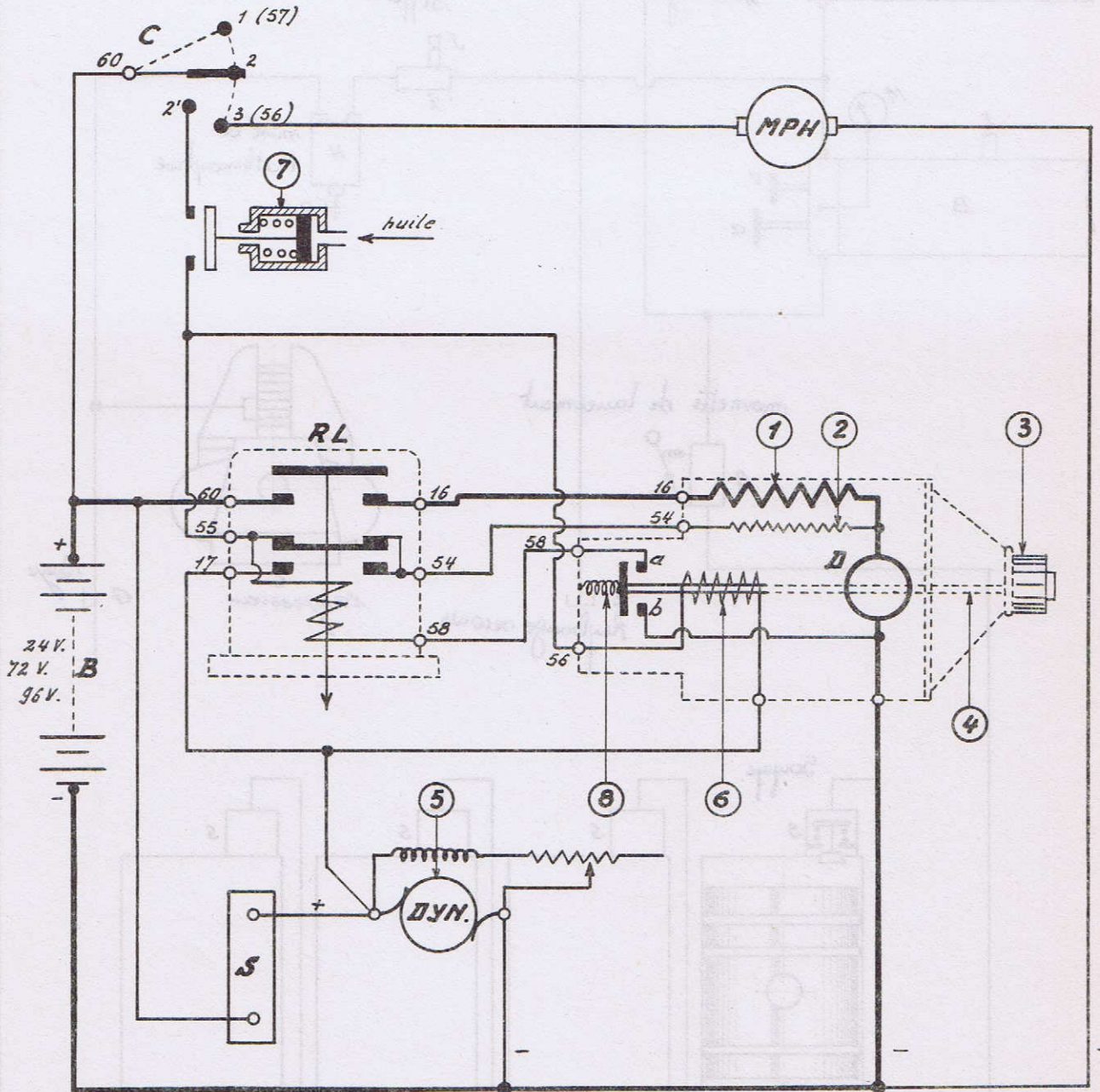
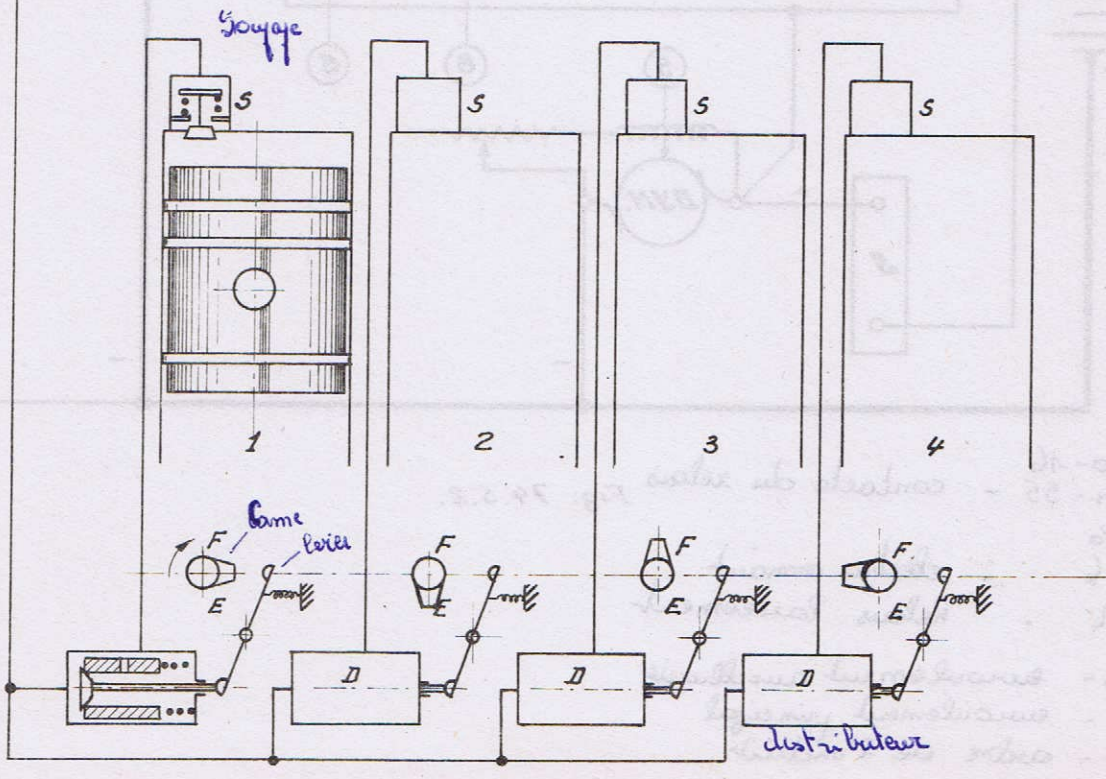
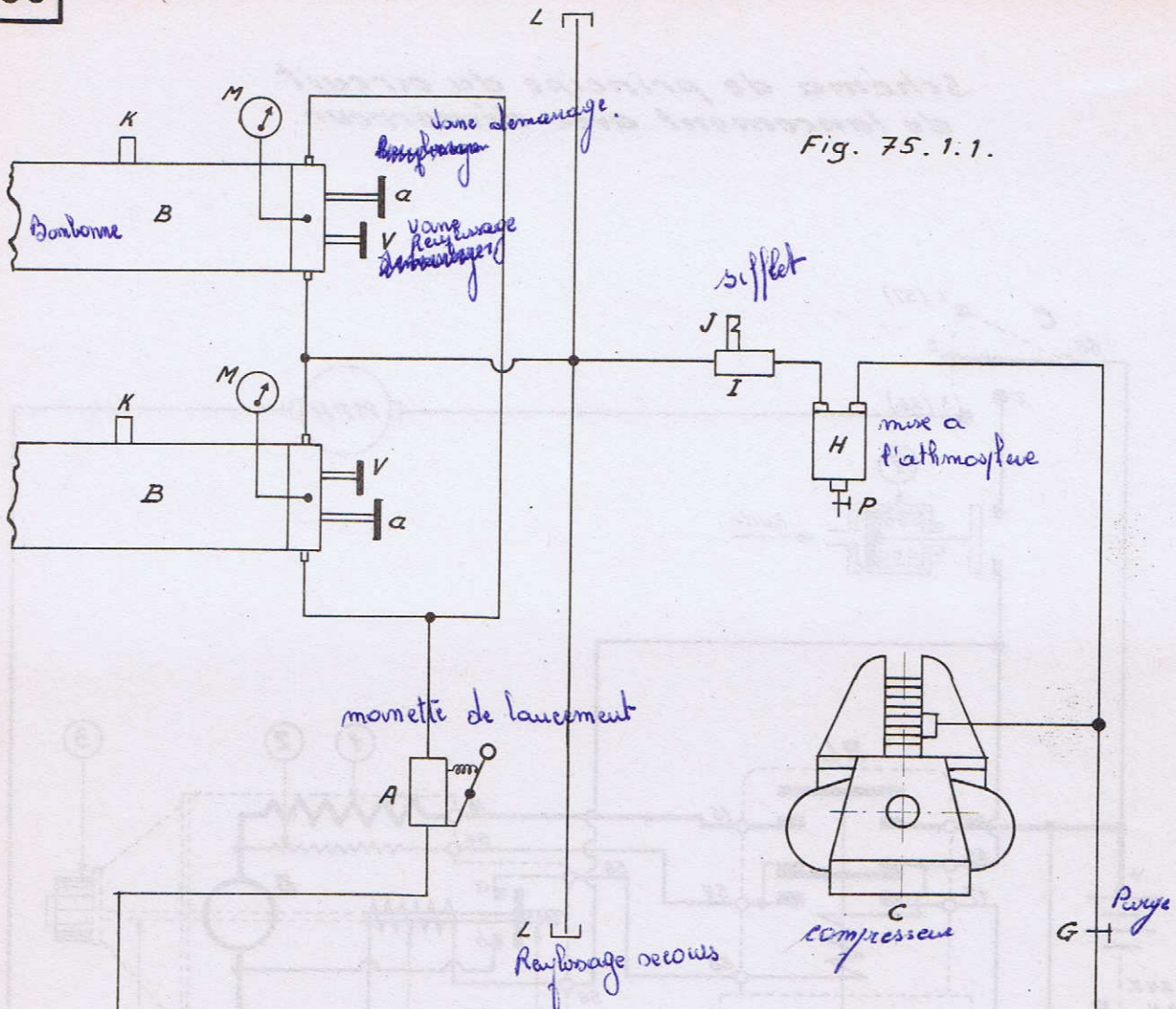


Fig.74.8.1.

Schéma de principe du circuit de lancement avec démarreur.



- Fig. 74.5.2.
- 60-16 - contacts du relais
 - 54-55 - contacts du relais
 - 56 - électro aimant
 - 6 - électro aimant
 - RL - Relais lancement
 - 2 - enroulement auxiliaire
 - 1 - enroulement principal
 - 4 - arbre de l'induit
 - 3 - pignon
 - 8 - Ressort de rappel
 - 6 - électro aimant



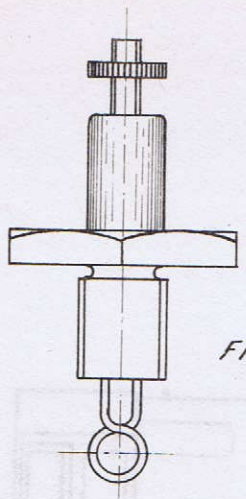


Fig. 75.5.1.

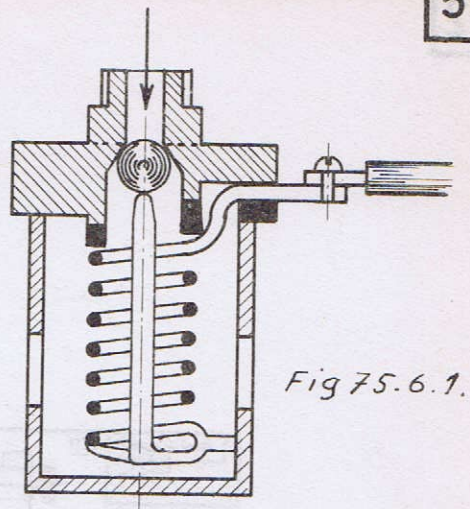


Fig. 75.6.1.

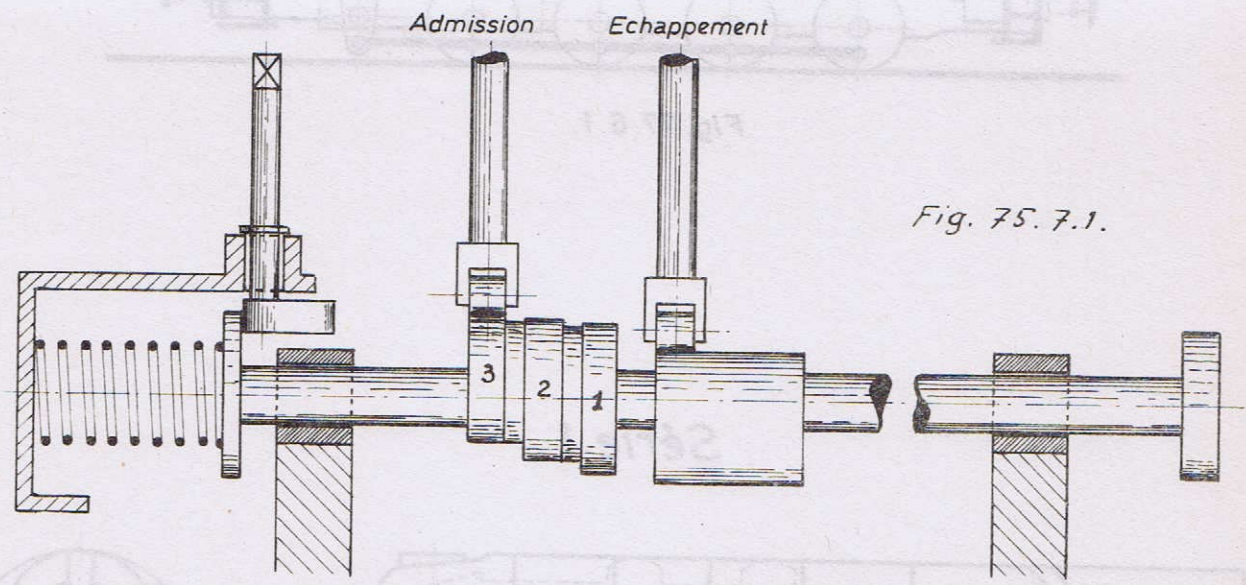


Fig. 75.7.1.

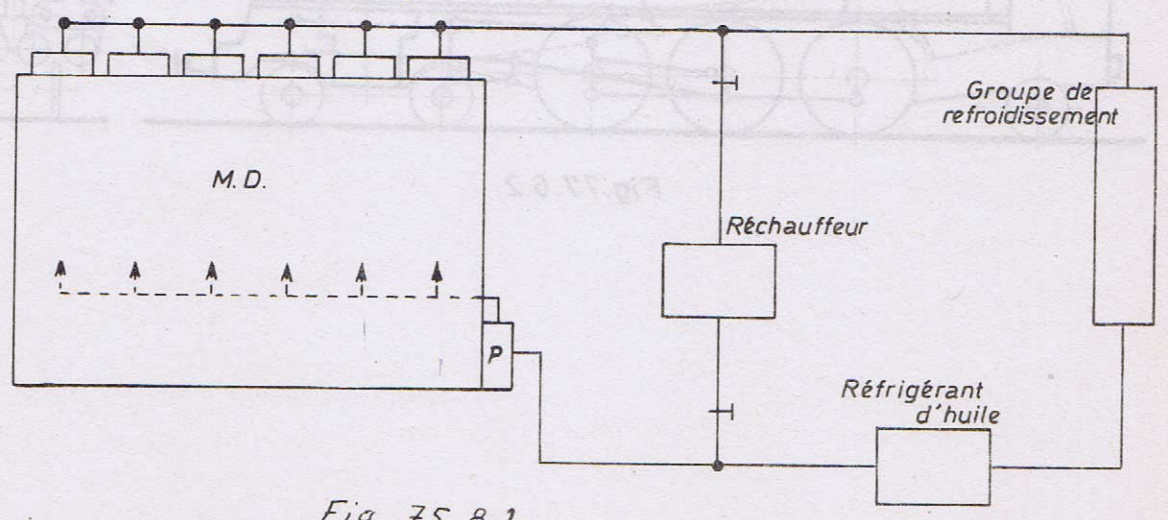


Fig. 75.8.1.

Série 72

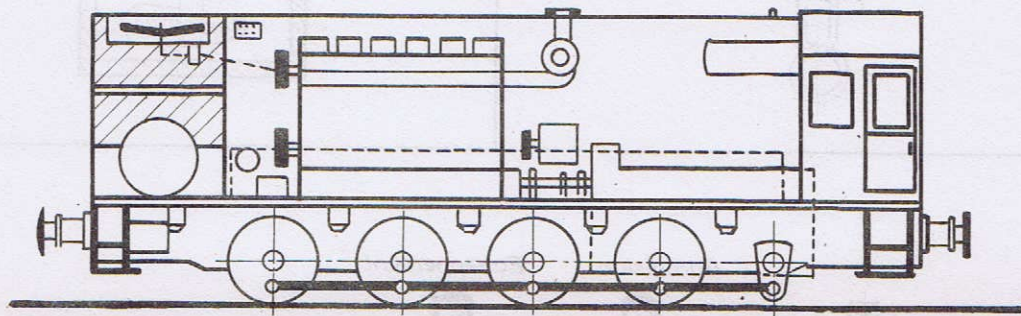


Fig. 77.6.1.

Série 1

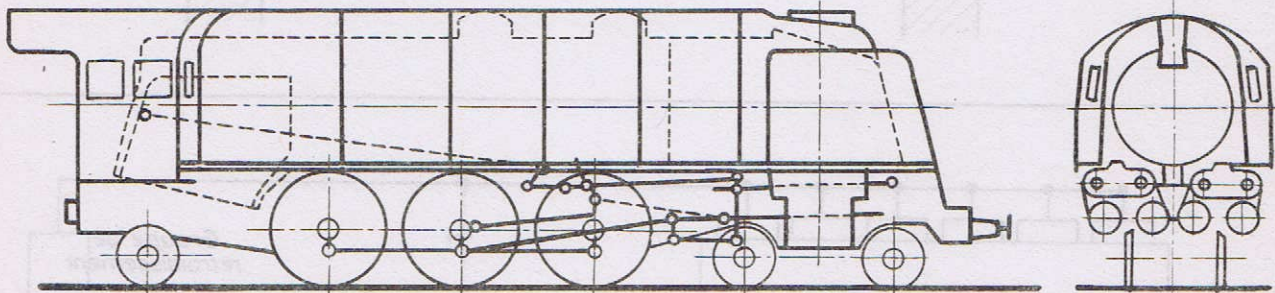


Fig. 77.6.2.

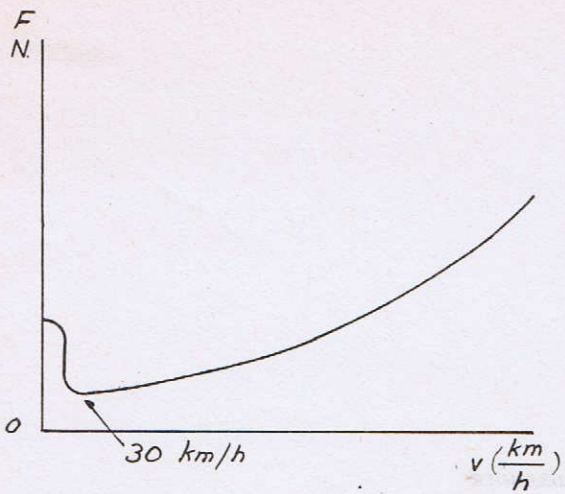


Fig. 78.0.1.

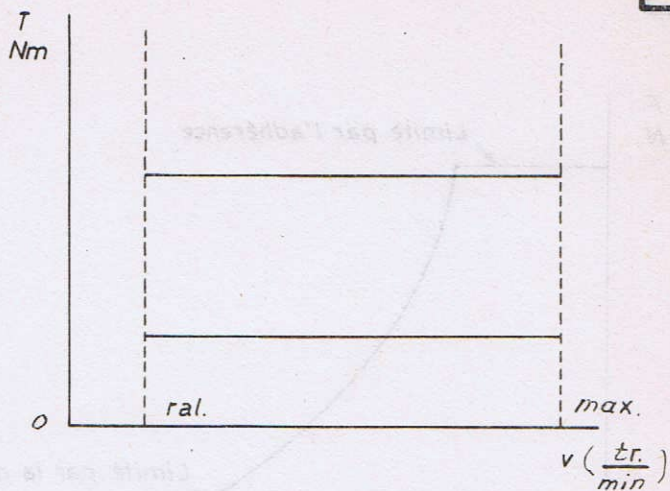


Fig. 78.2.4.

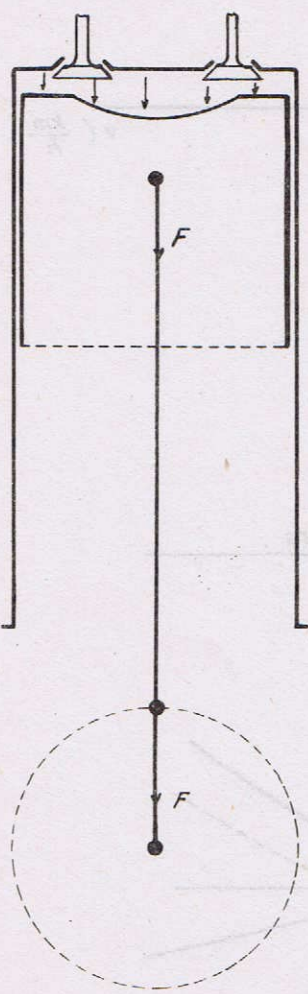


Fig. 78.2.1.

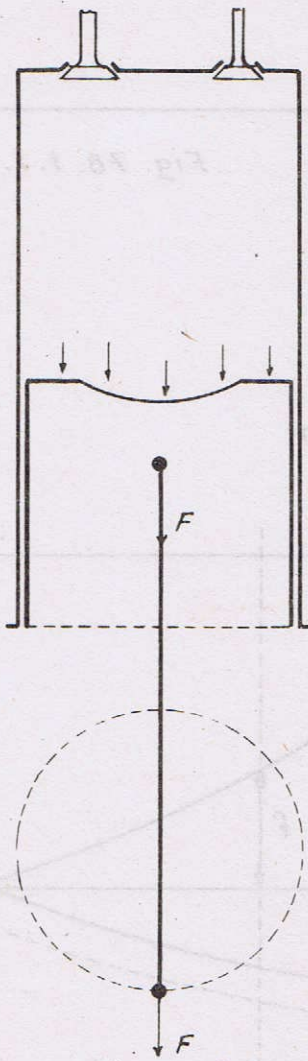


Fig. 78.2.2.

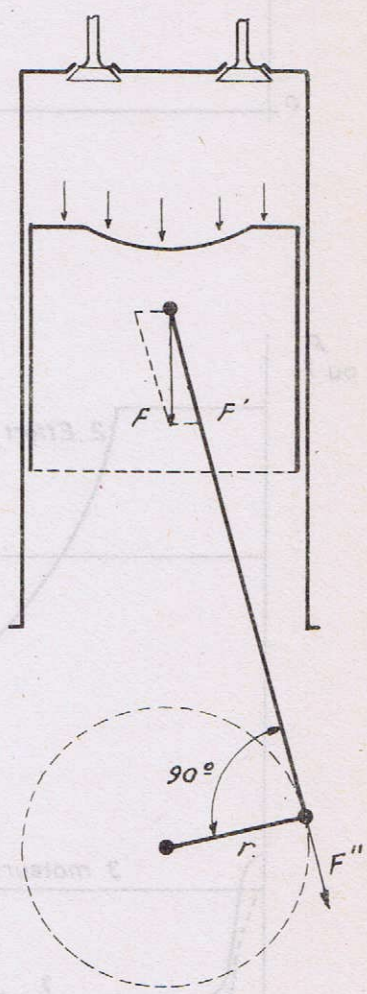


Fig. 78.2.3.

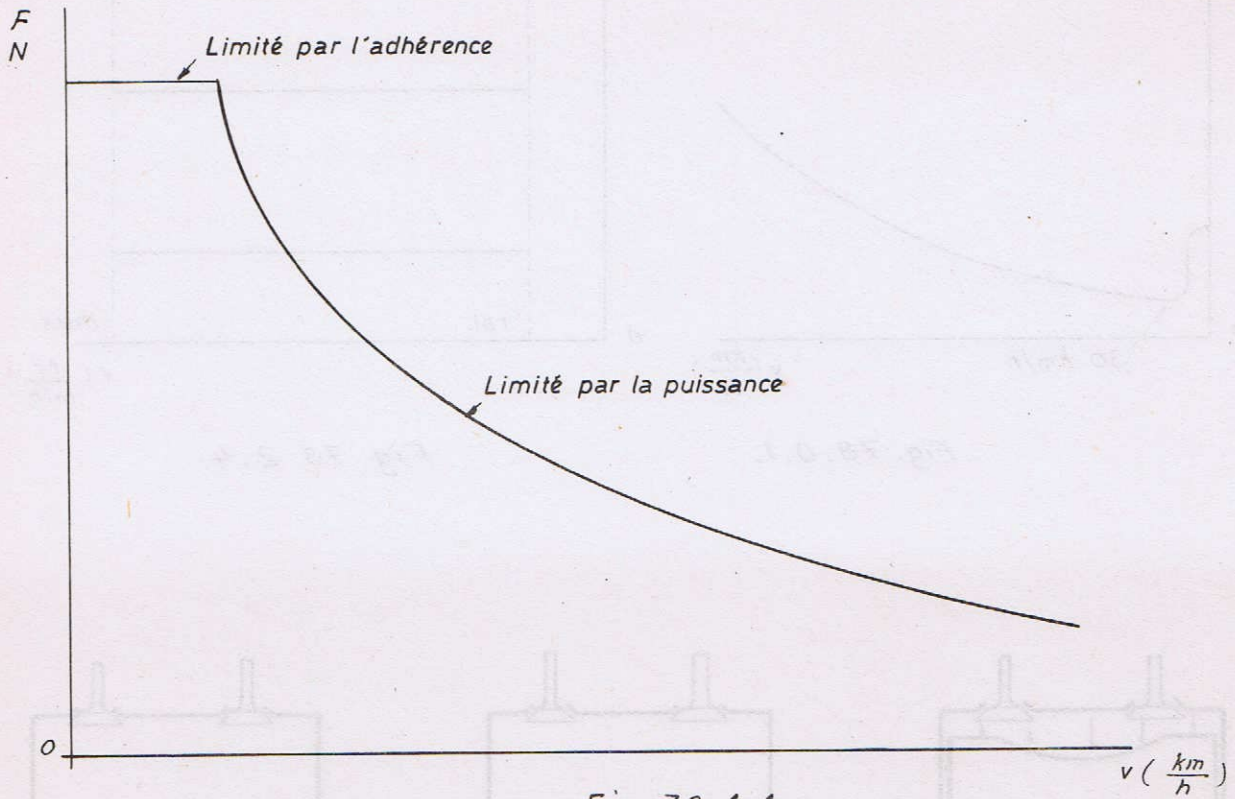


Fig. 78. 1. 1.

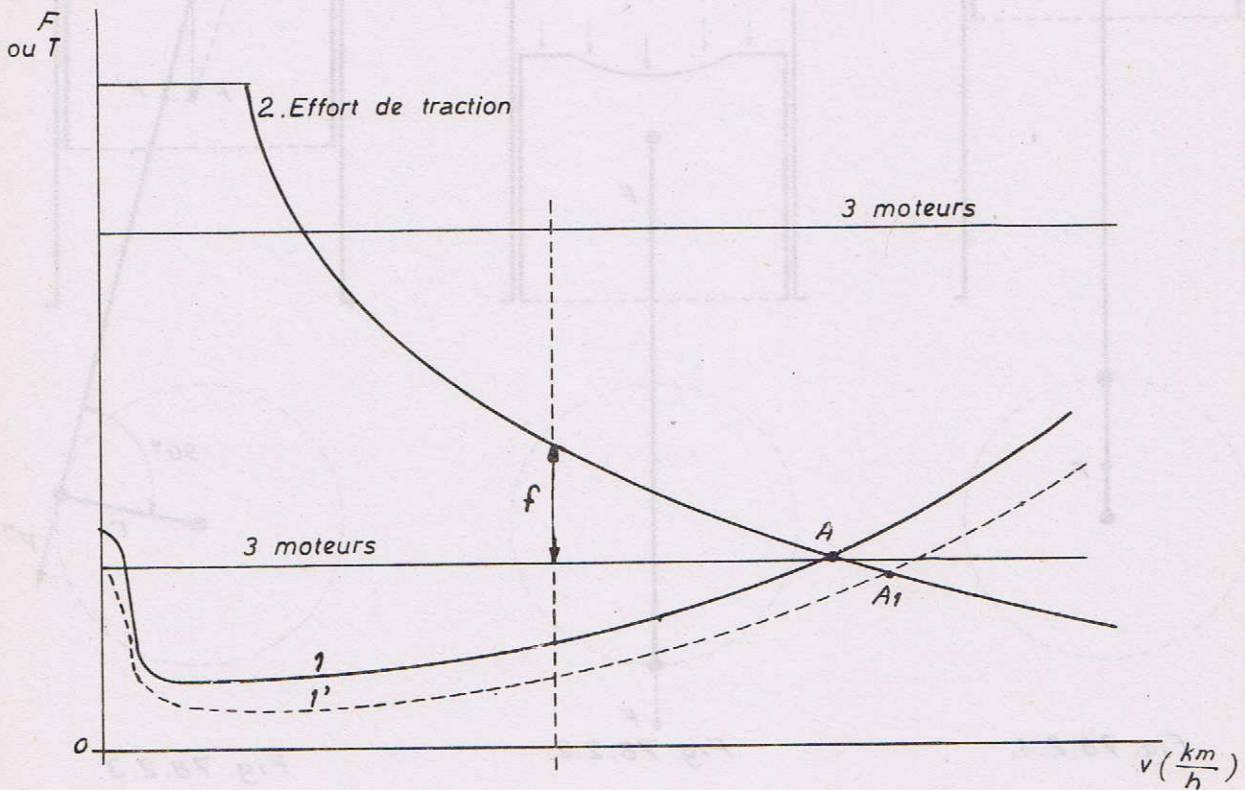


Fig. 78. 4. 1.

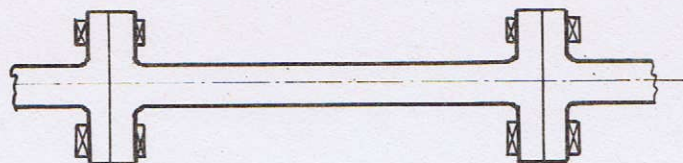


Fig. 79.1.1.

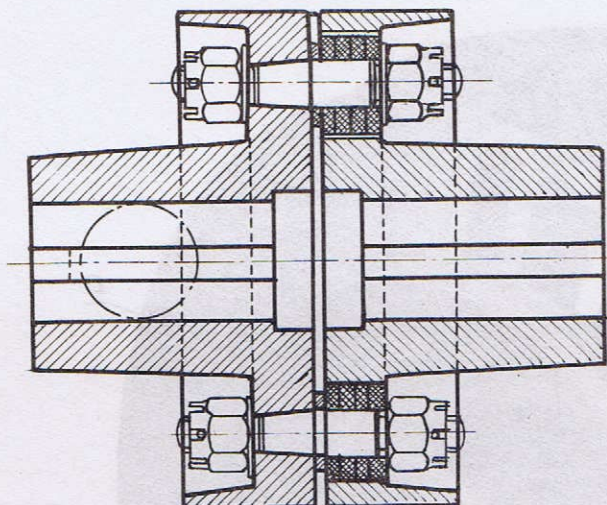


Fig. 79.2.1.

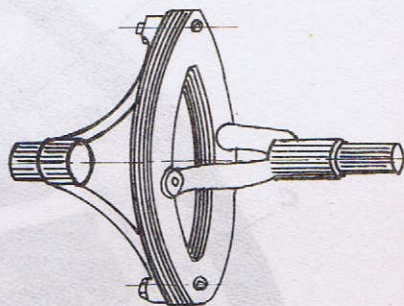


Fig. 79.2.2.

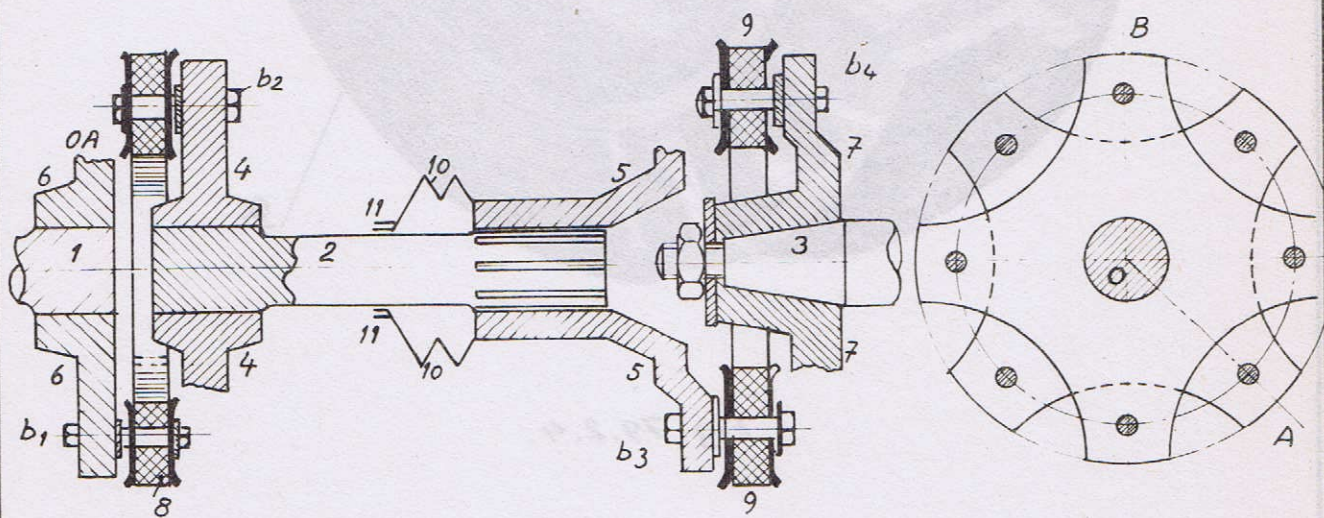


Fig. 79.2.3.

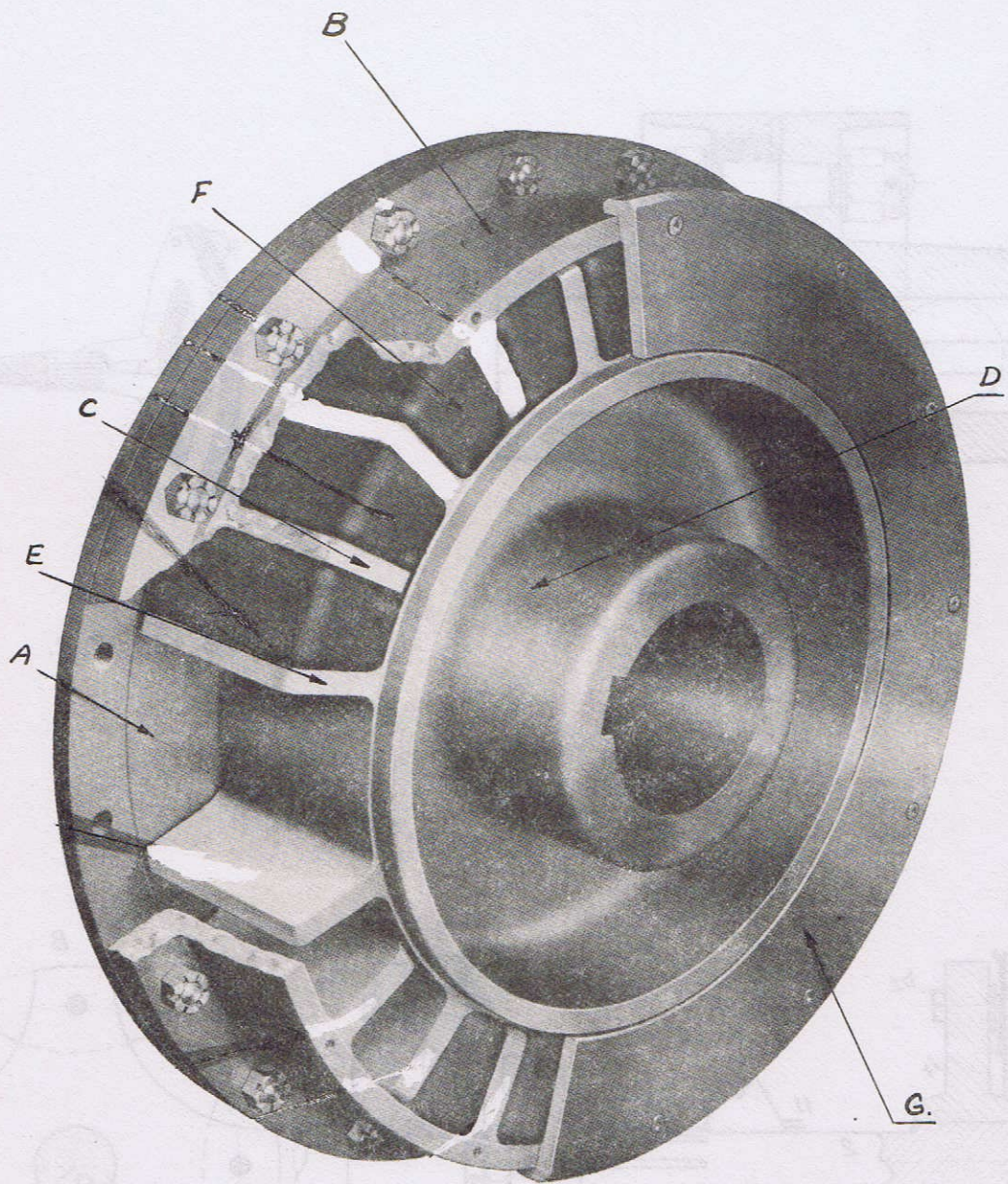


Fig. 79.2.4.

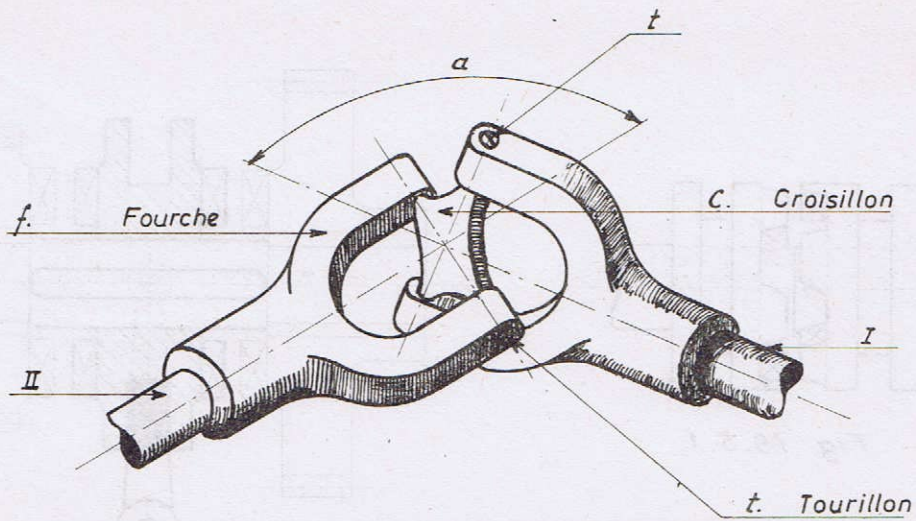


Fig. 79.4.1.

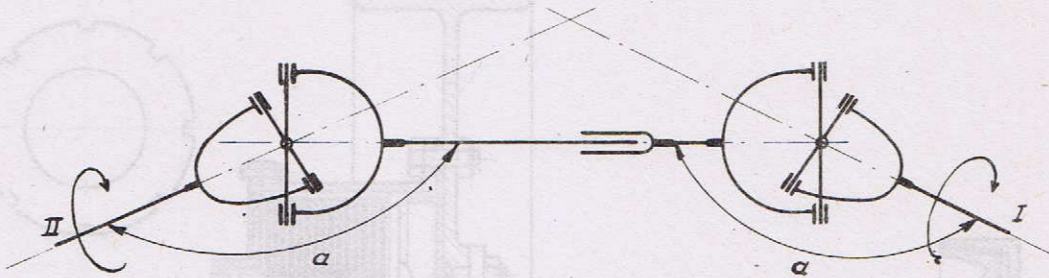


Fig. 79.4.2.

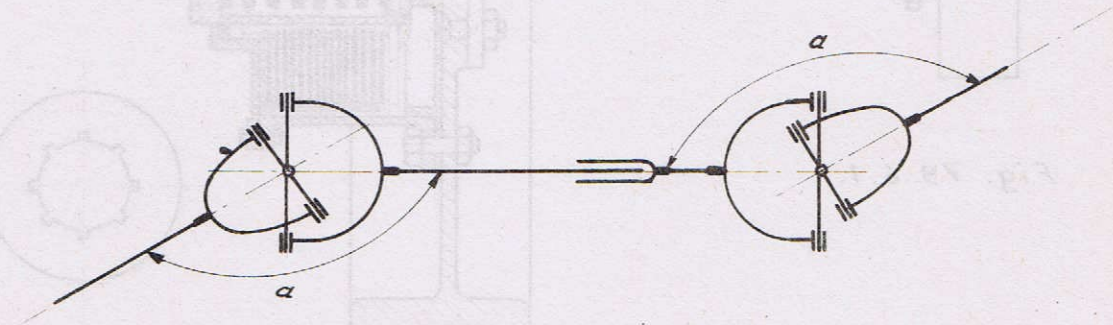


Fig. 79.4.3.

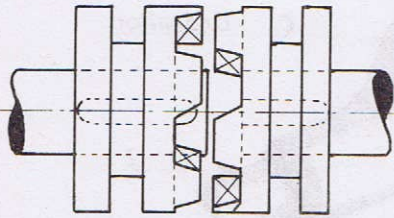


Fig. 79.5.1.

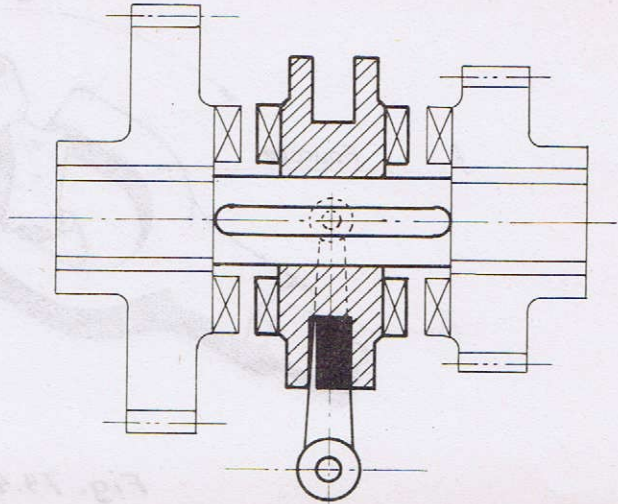


Fig. 79.5.2.

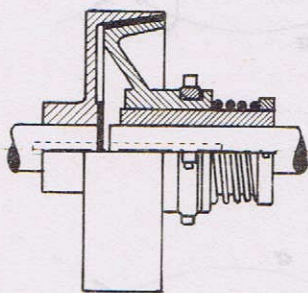


Fig. 79.6.1.

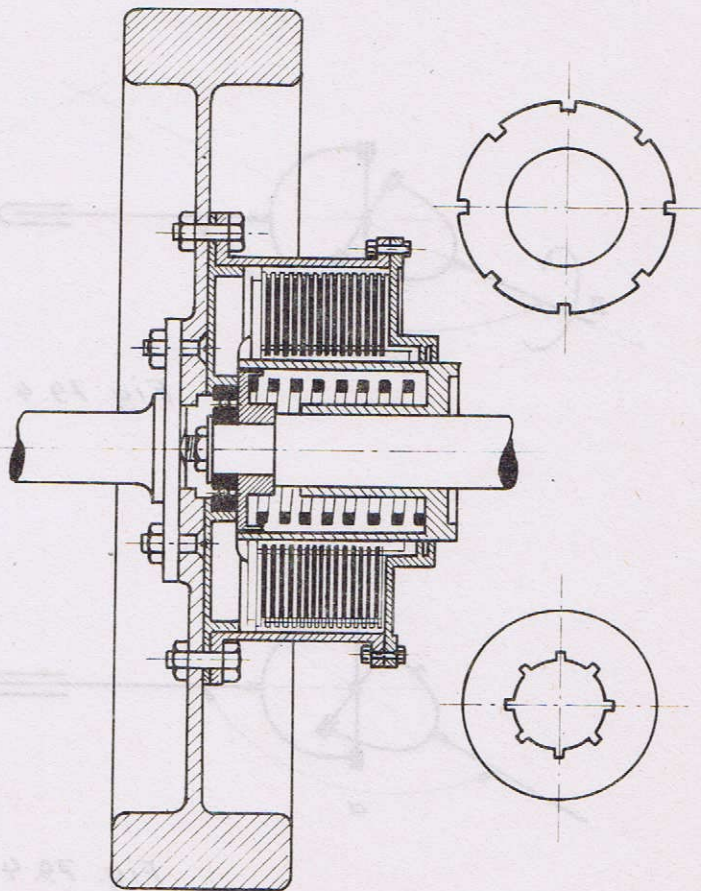


Fig. 79.6.2.

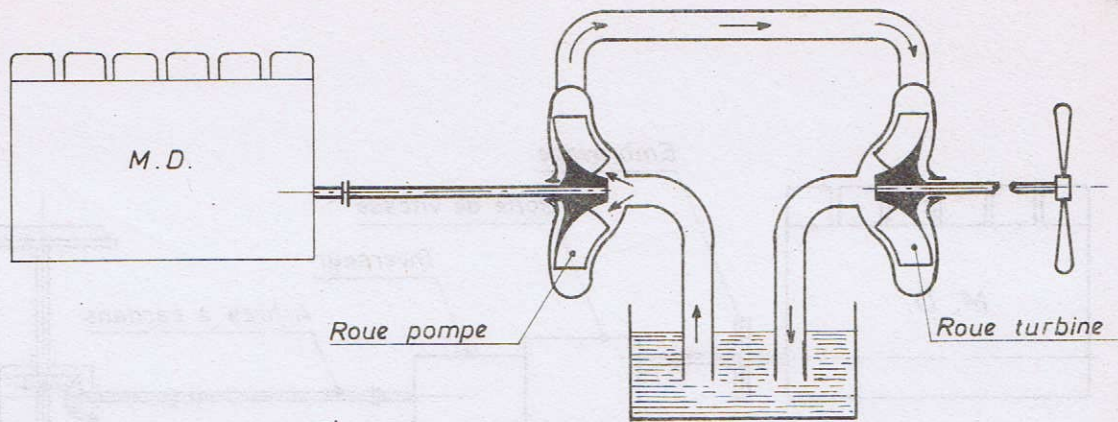


Fig. 79. 7. 1.

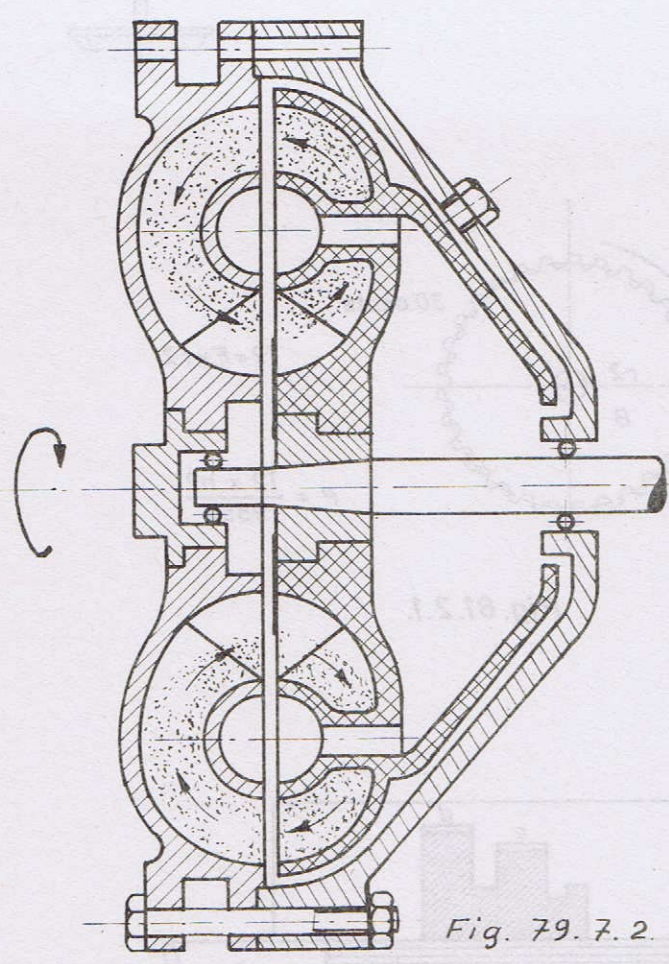


Fig. 79. 7. 2.

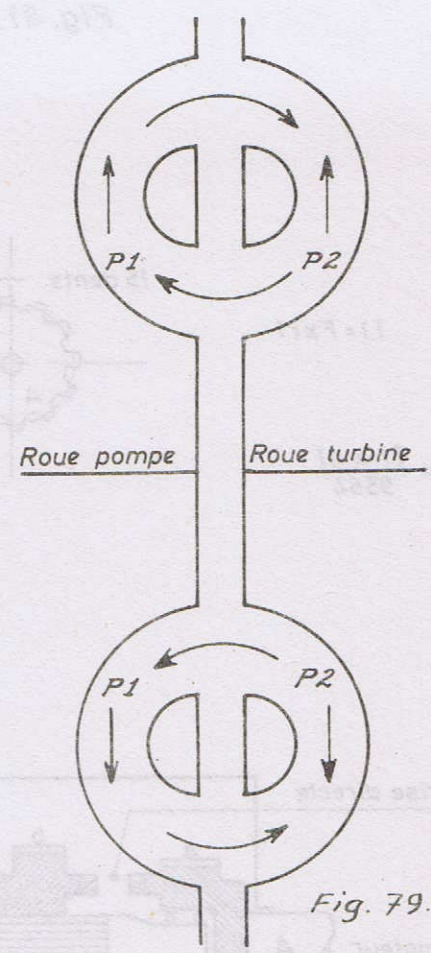


Fig. 79. 7. 4.

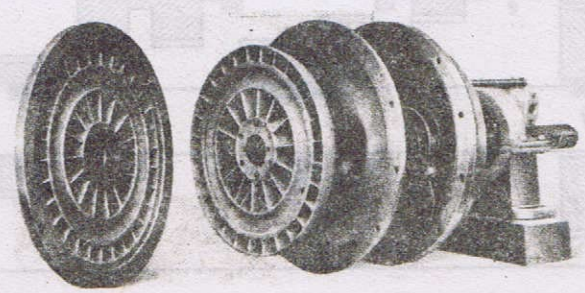


Fig. 79. 7. 3.

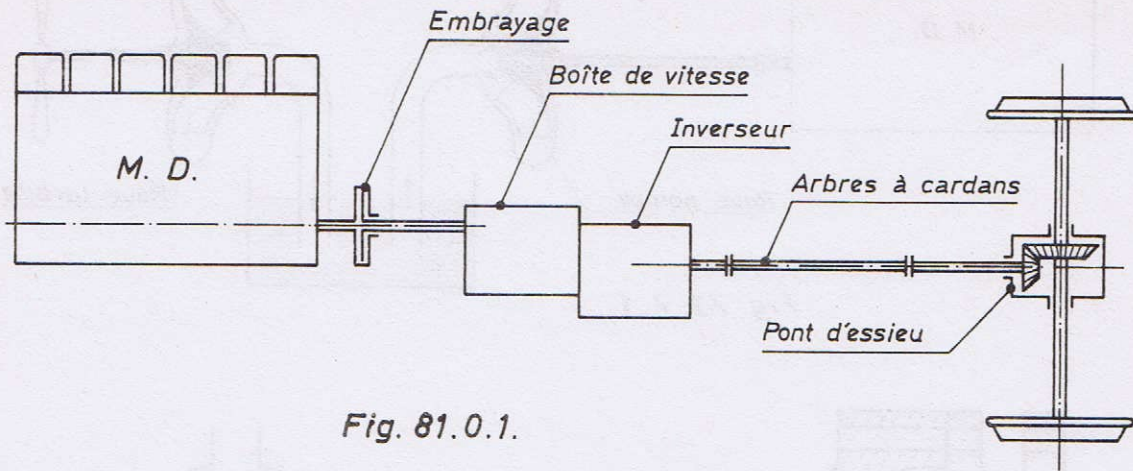


Fig. 81.0.1.

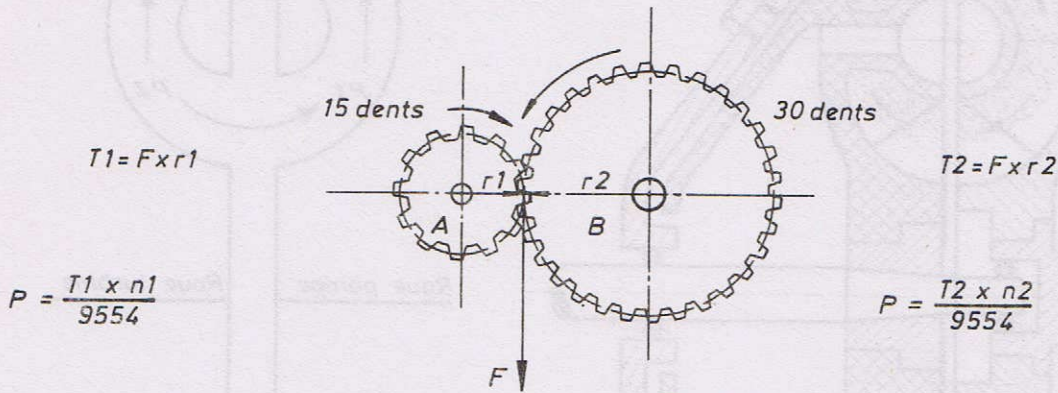


Fig. 81.2.1.

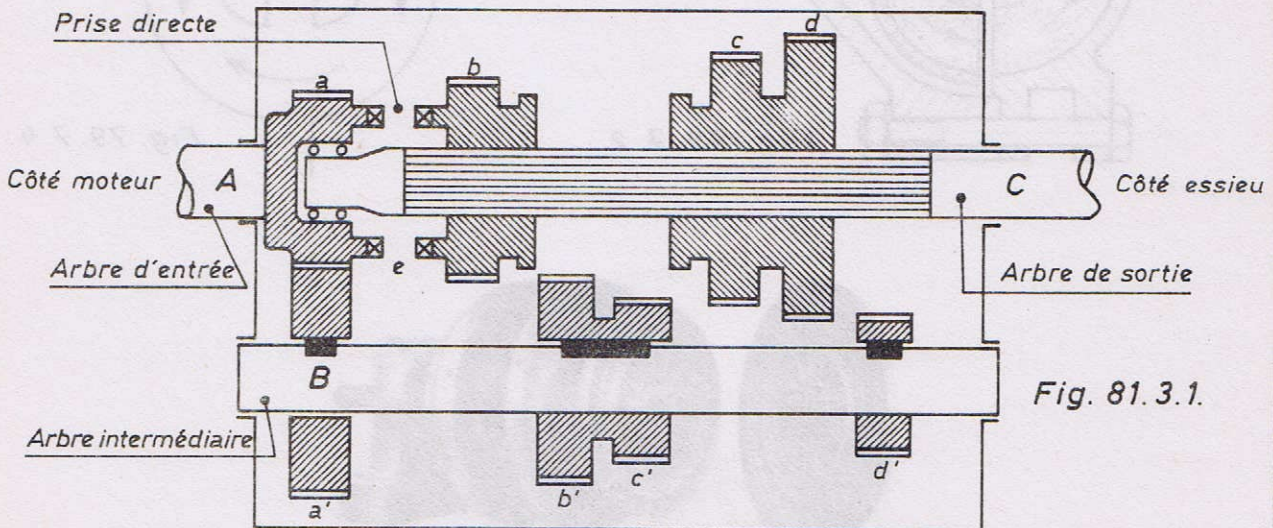


Fig. 81.3.1.

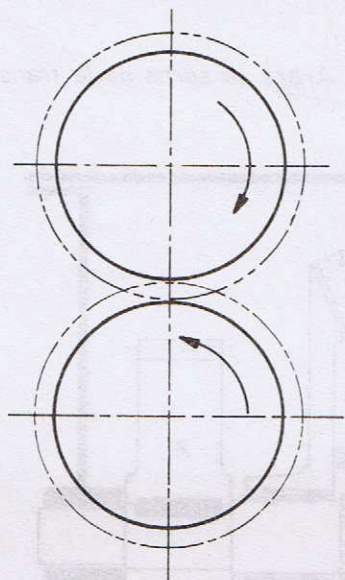


Fig. 81.4.1.

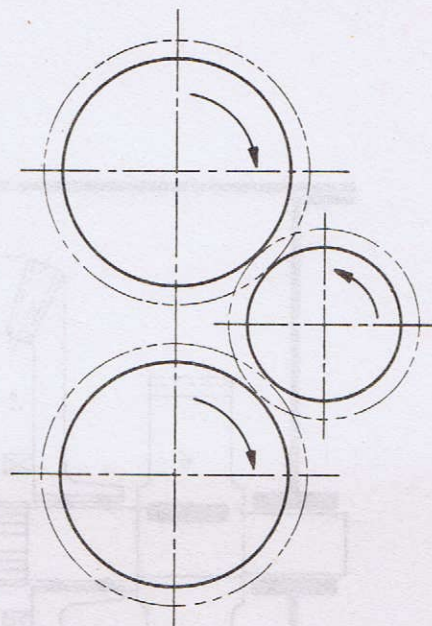


Fig. 81.4.2.

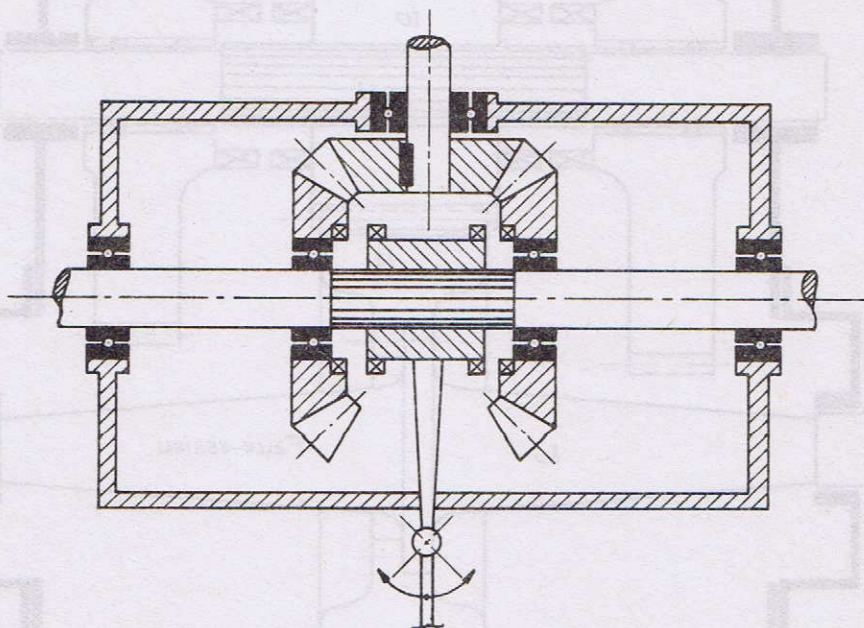
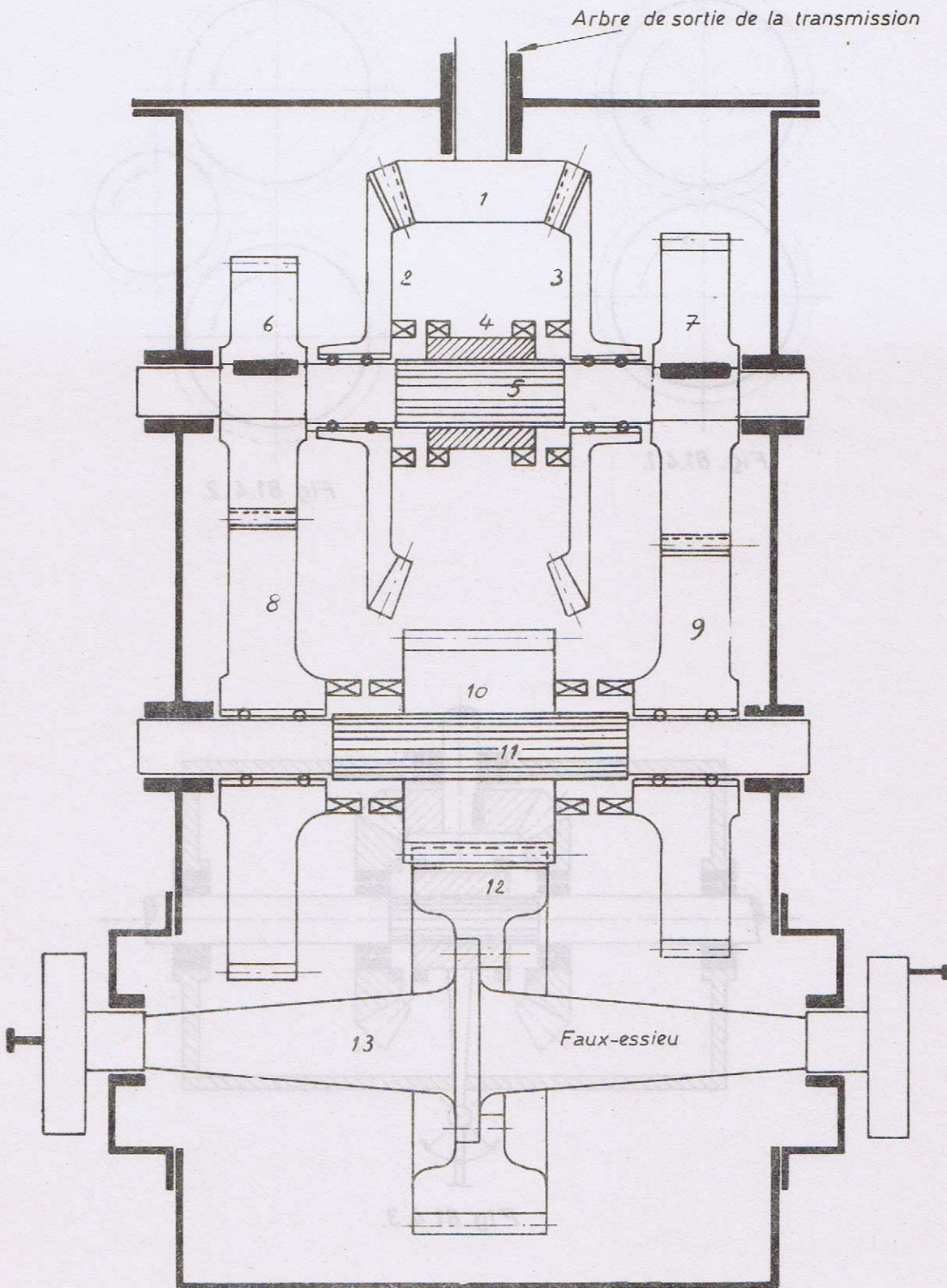


Fig. 81.4.3.



Régime manoeuvre

Fig. 82.0.1.

Régime de ligne

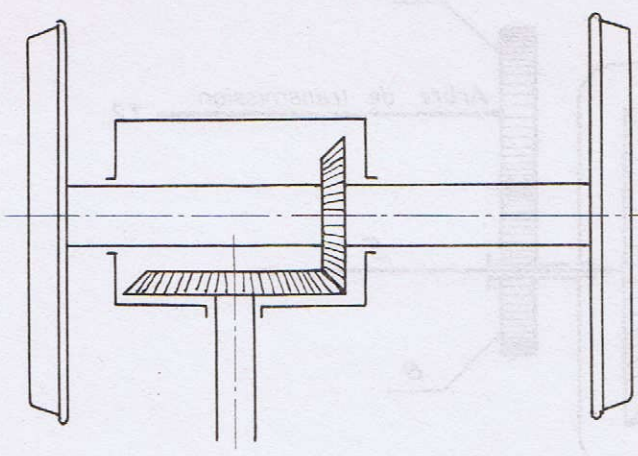


Fig. 82.1.1.

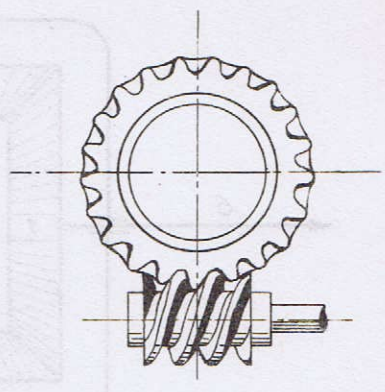


Fig. 82.1.2.

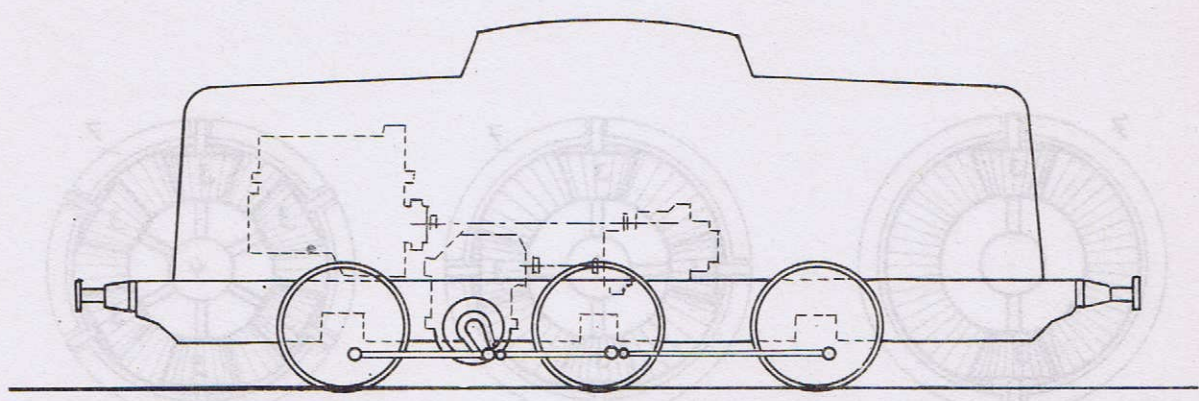


Fig. 82.1.3.

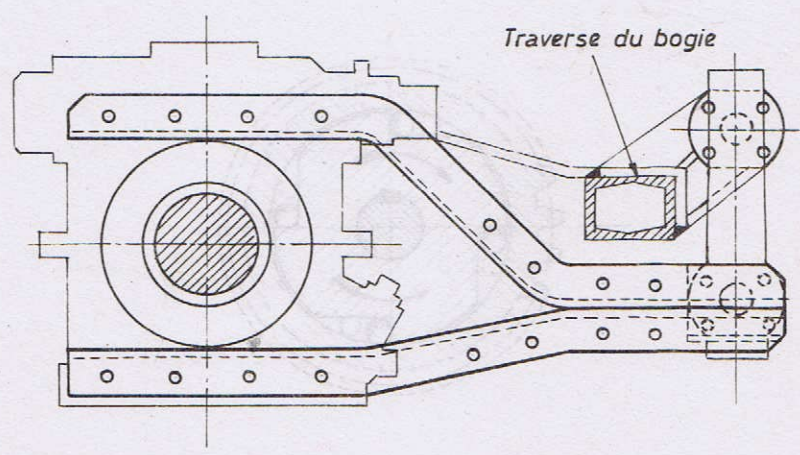
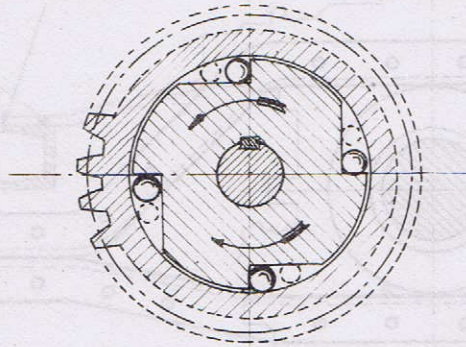
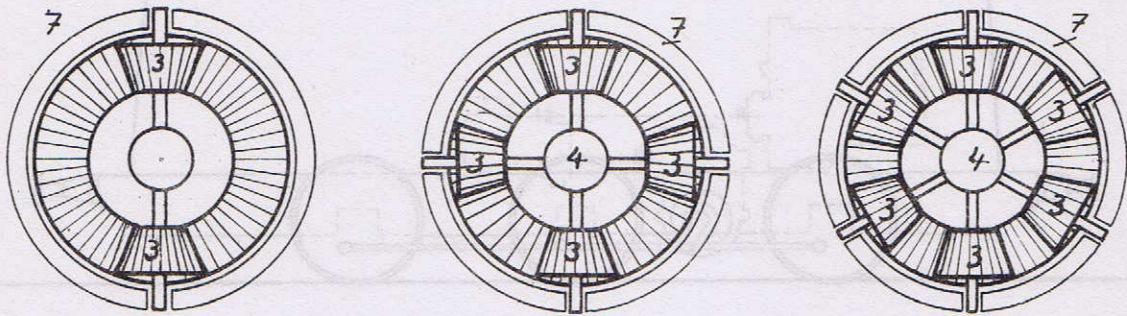
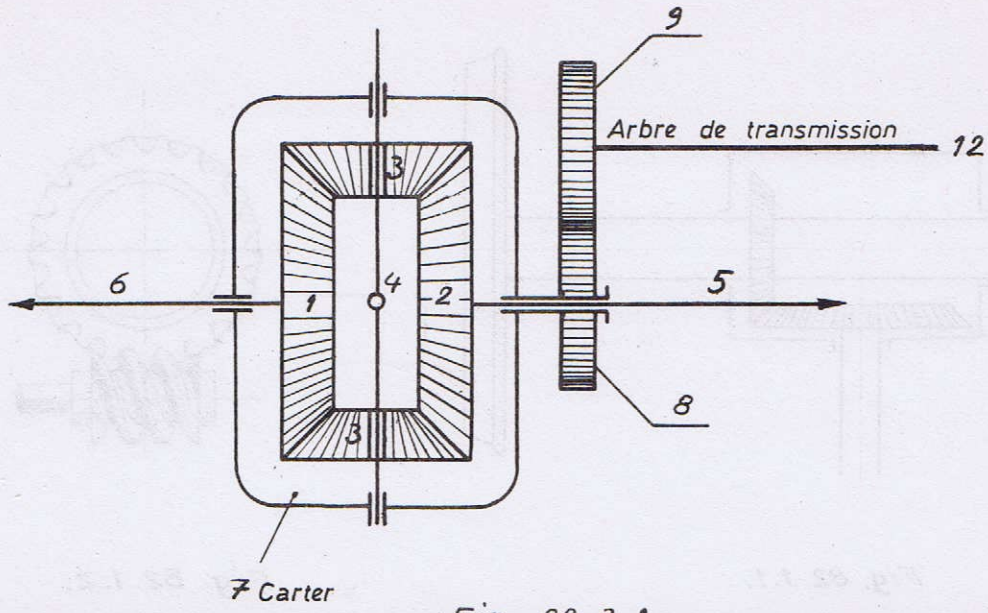


Fig. 82.2.1.



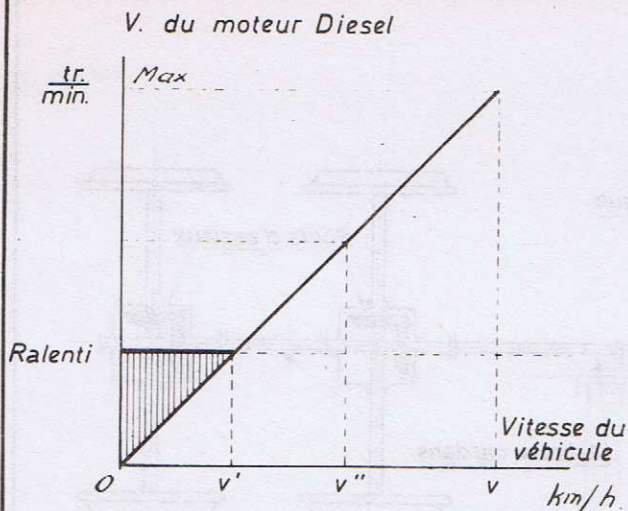


Fig. 83.2.1.

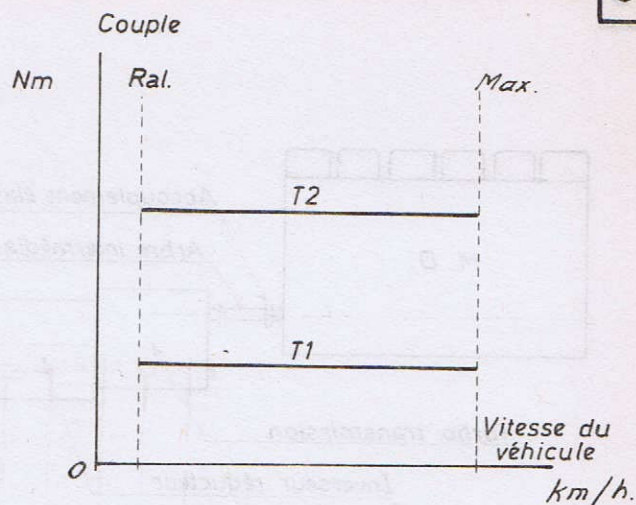


Fig. 83.3.1.

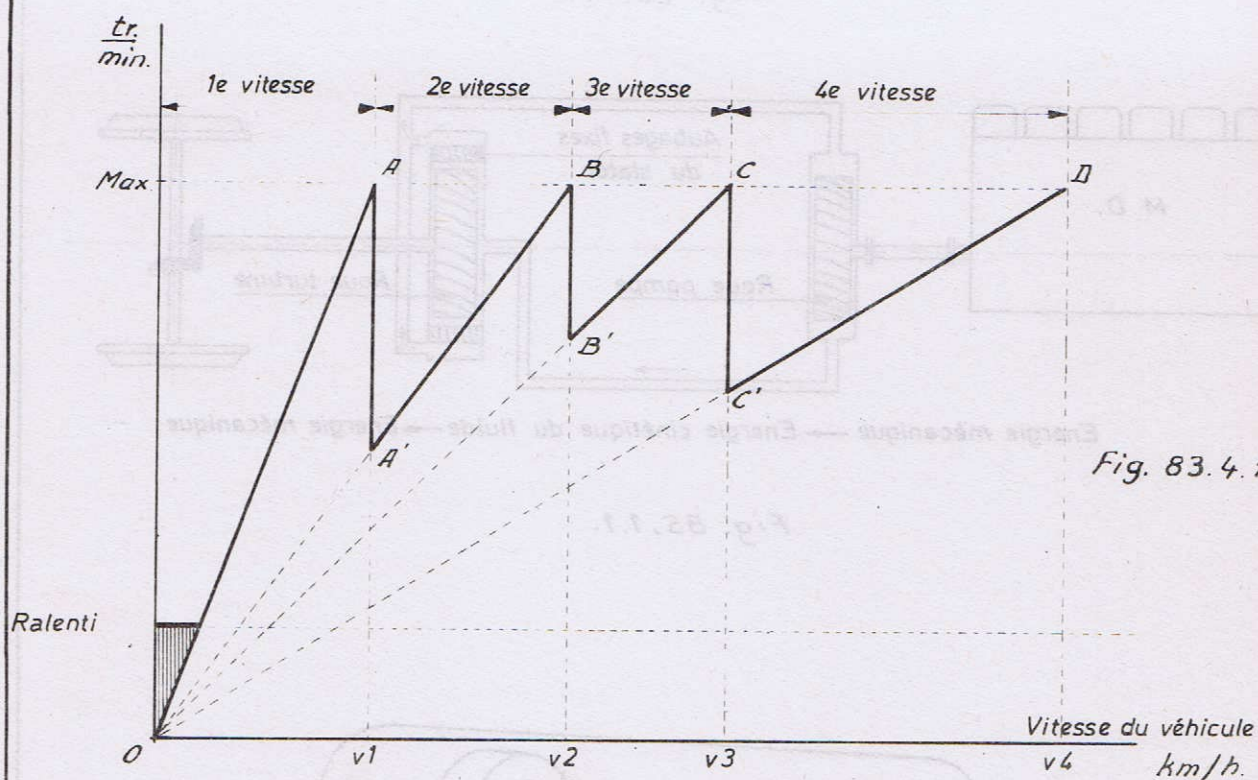


Fig. 83.4.1.

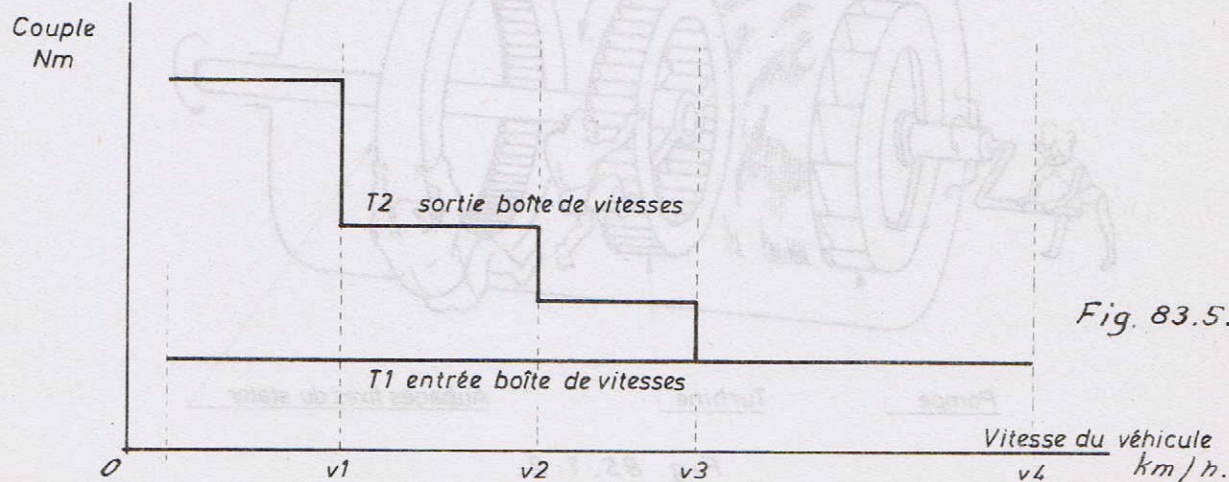


Fig. 83.5.1.

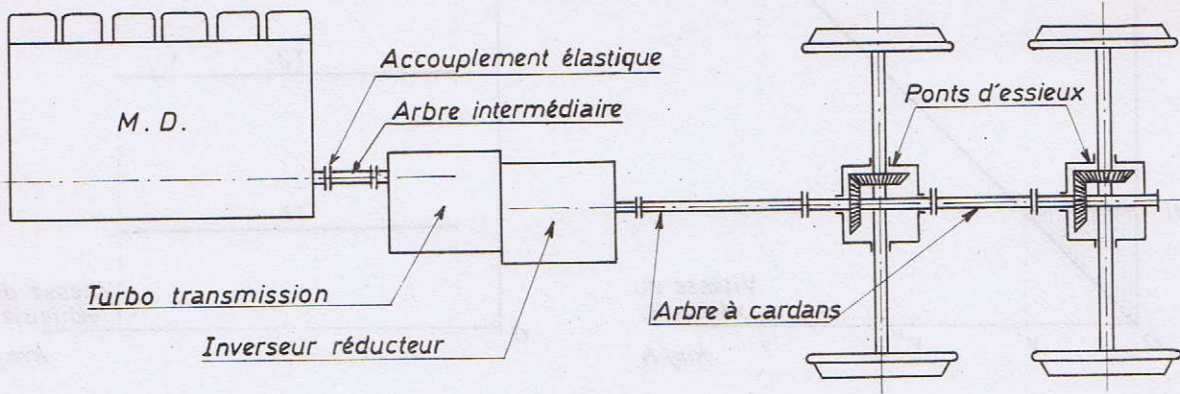


Fig. 85.0.1.

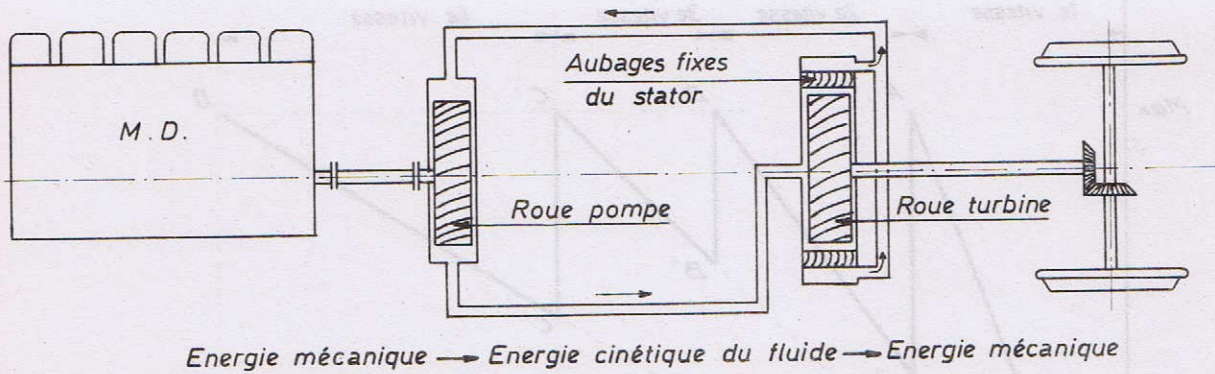


Fig. 85.1.1.

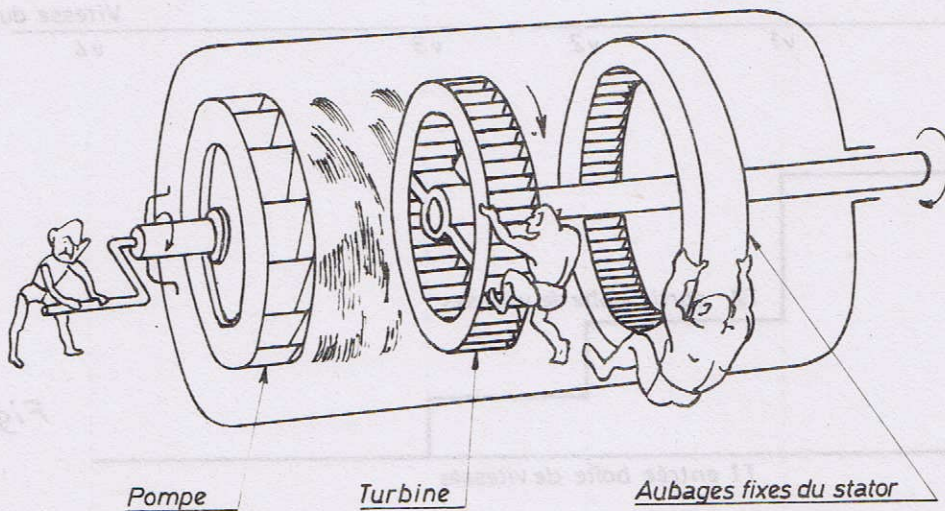


Fig. 85.1.2.

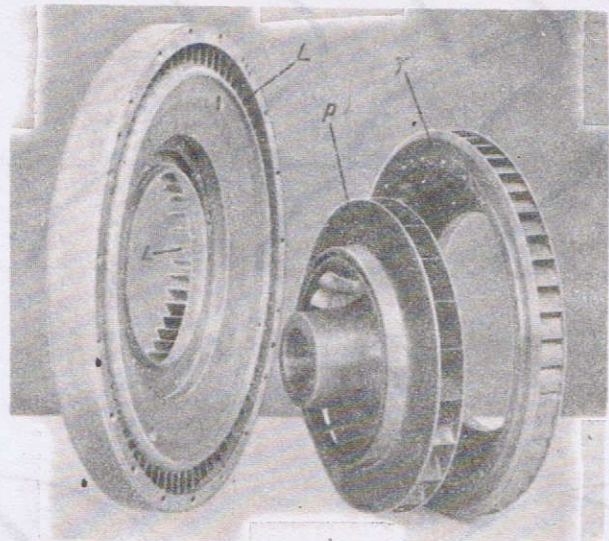


Fig. 85.2.1.

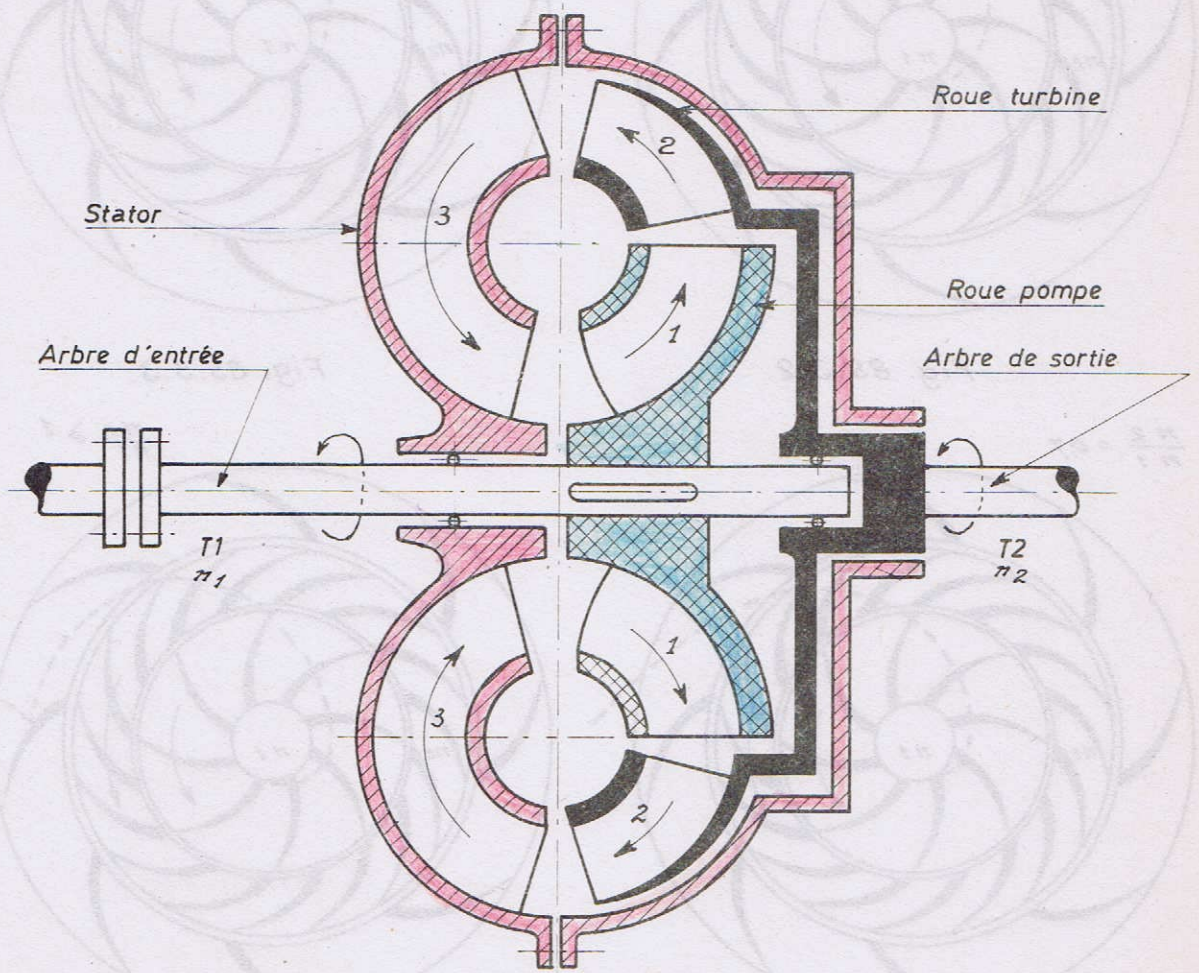


Fig. 85.2.2.

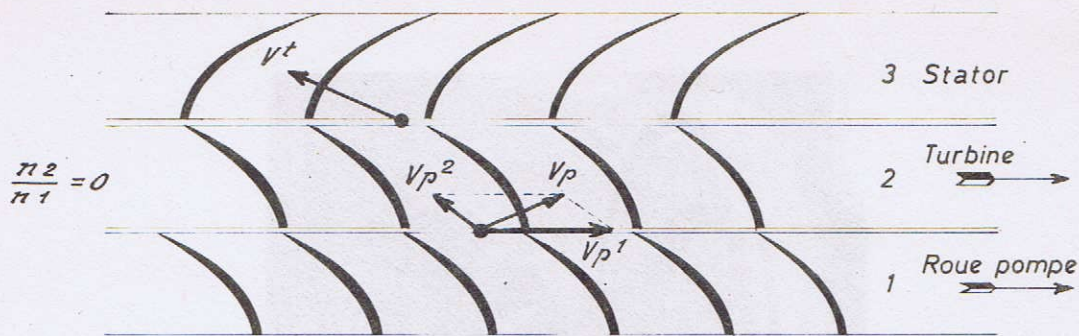


Fig. 85.3.1.

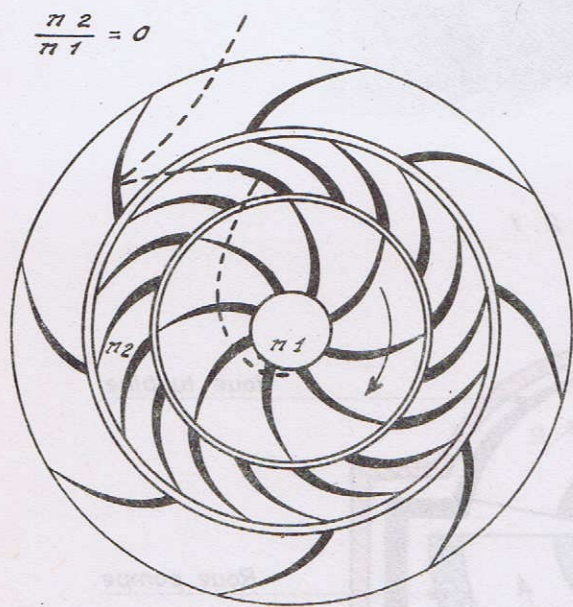


Fig. 85.3.2

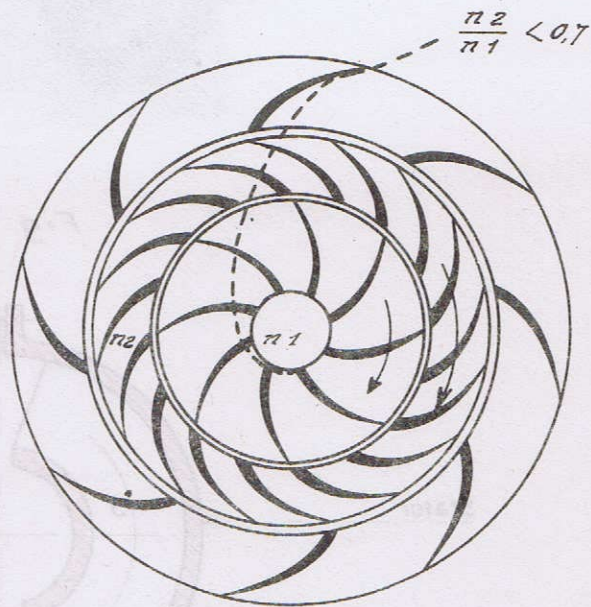


Fig. 85.3.3.

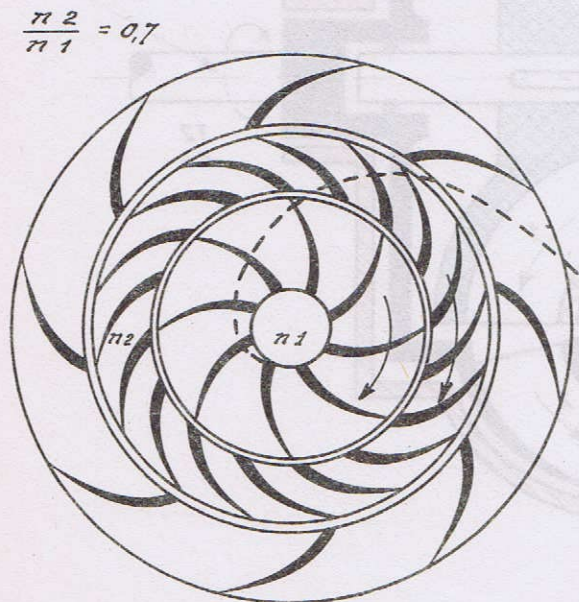


Fig. 85.3.4.

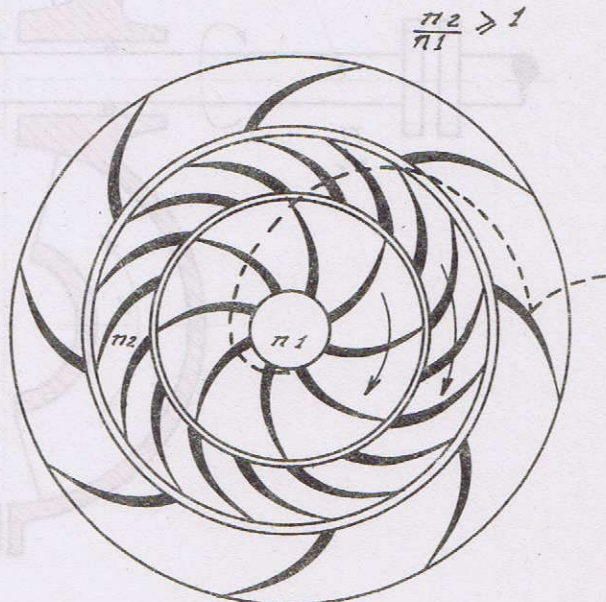
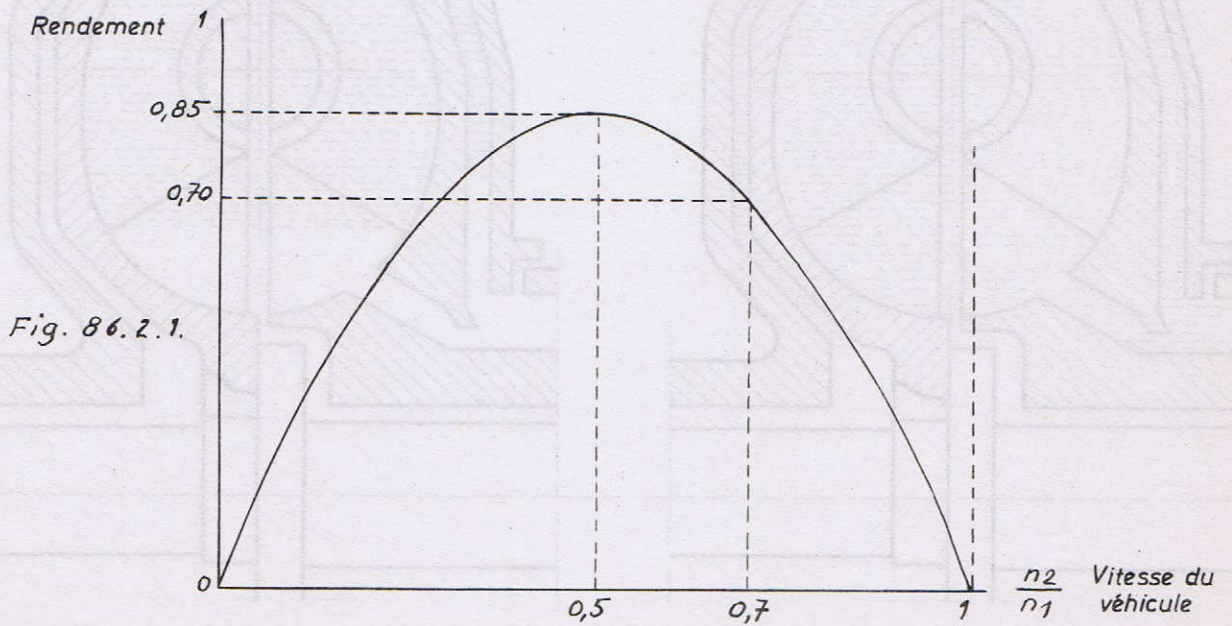
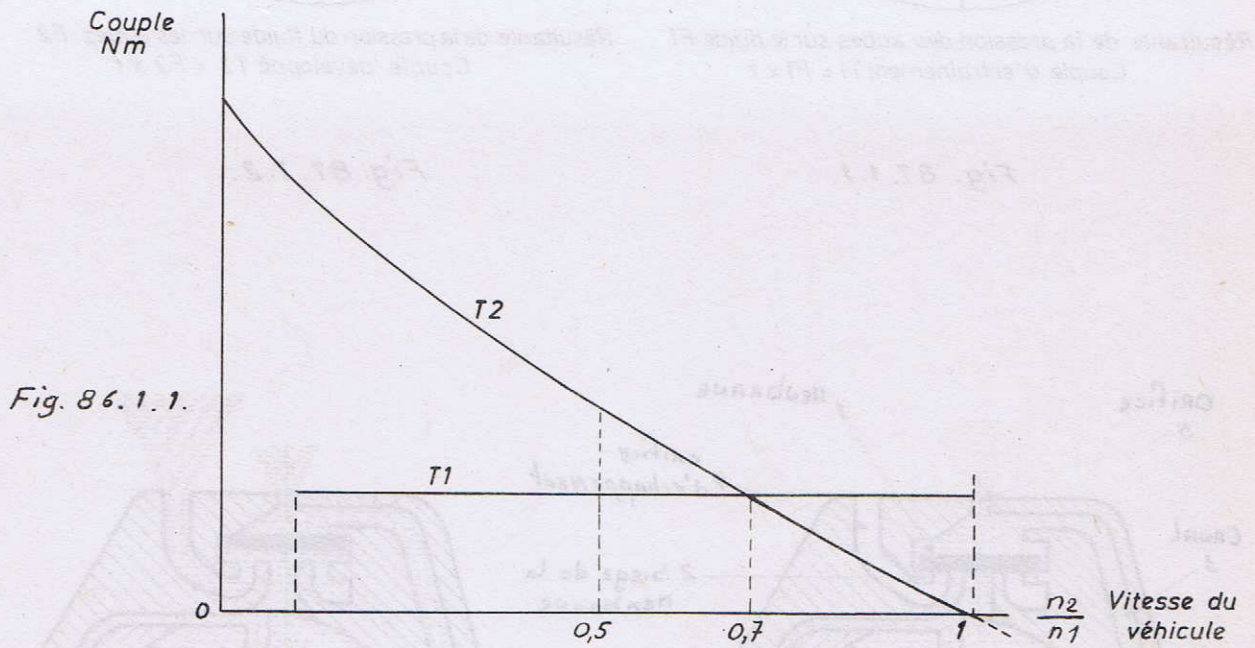
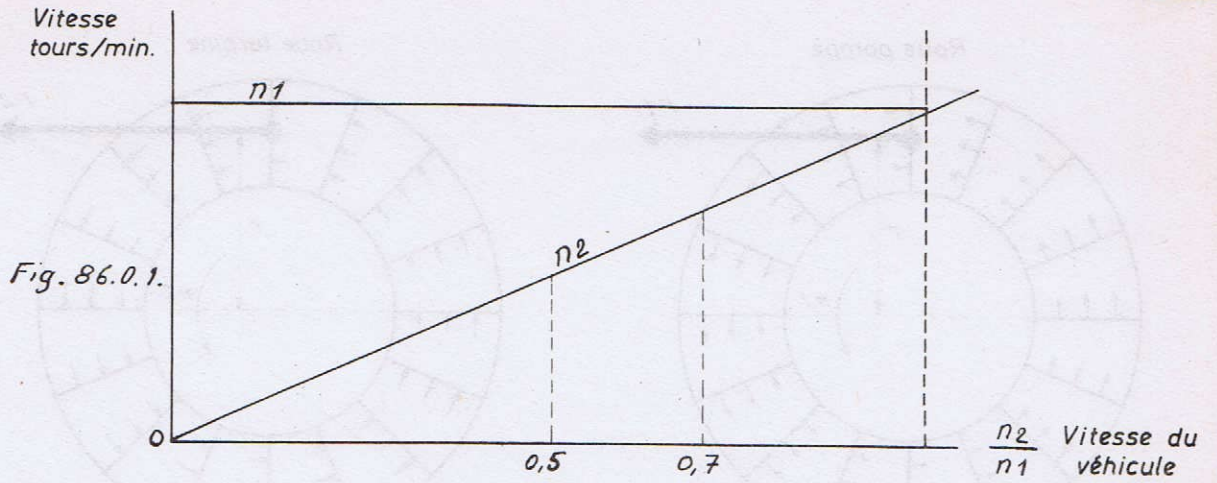
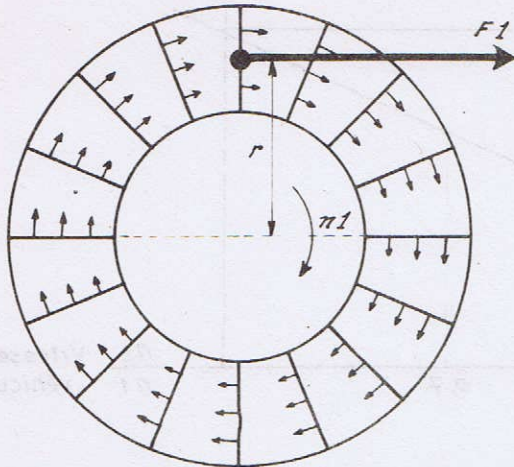


Fig. 85.3.5.



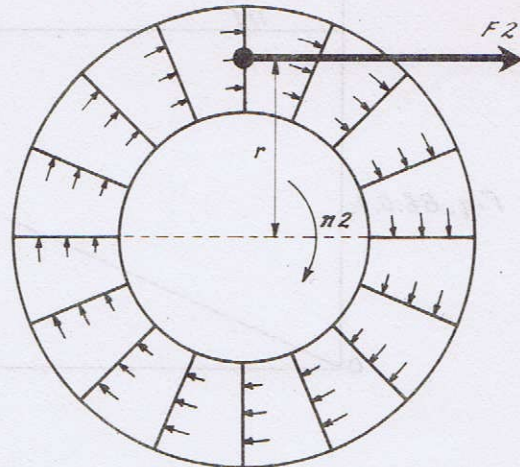
Roue pompe



Résultante de la pression des aubes sur le fluide $F1$
Couple d'entraînement $T1 = F1 \times r$

Fig. 87.1.1.

Roue turbine



Résultante de la pression du fluide sur les aubes $F2$
Couple développé $T2 = F2 \times r$

Fig. 87.1.2.

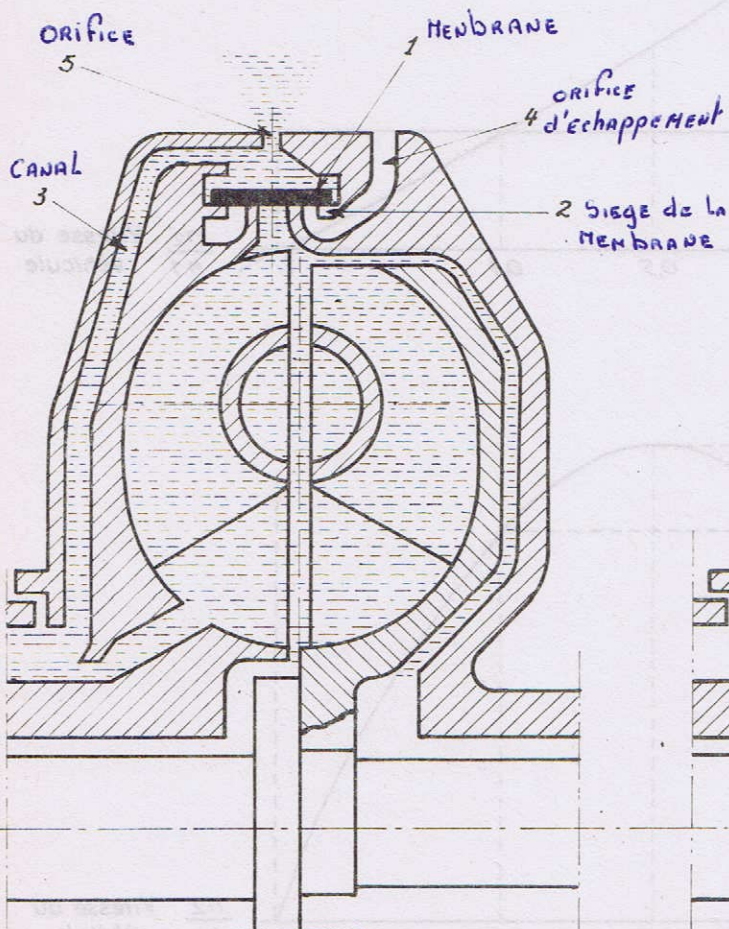


Fig. 87.4.1.

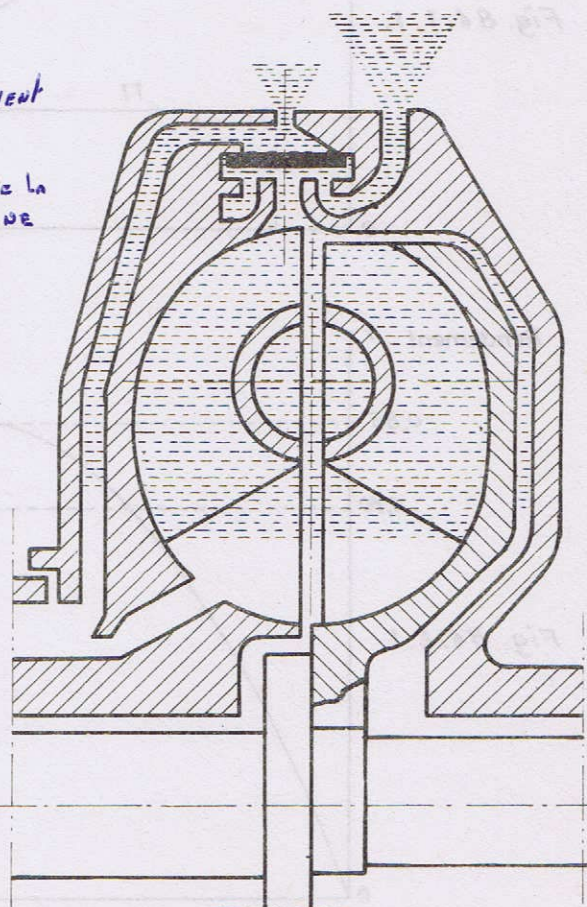


Fig. 87.4.2.

Couple
Nm

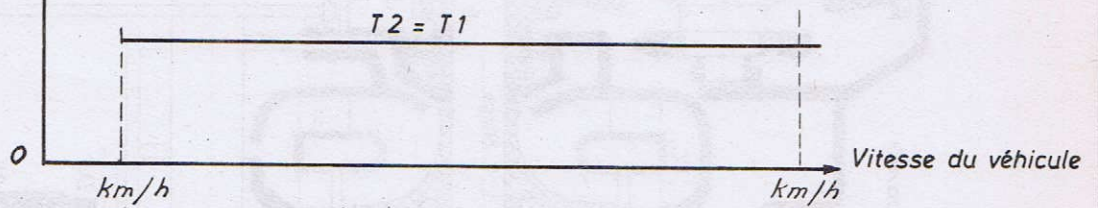


Fig. 87.1.3.

Vitesse M.D.
tours/min.

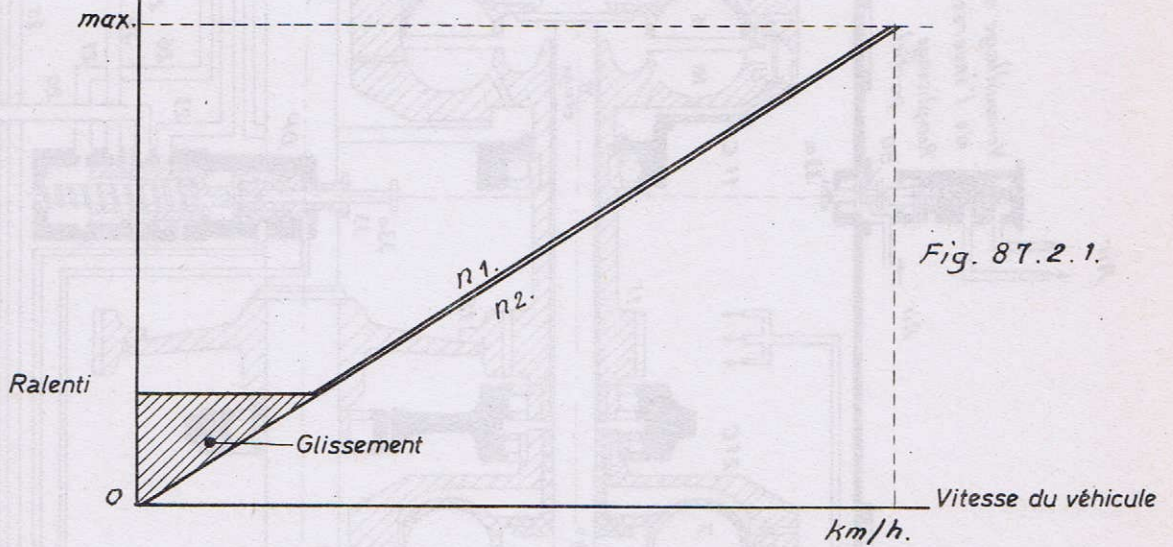
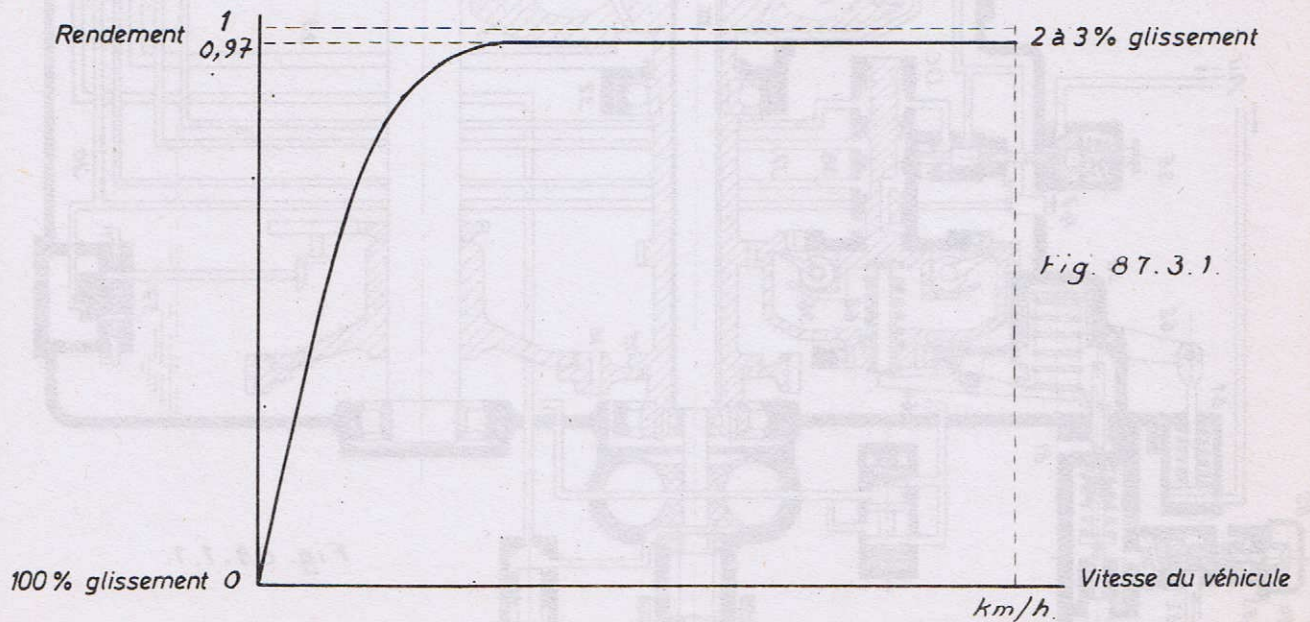


Fig. 87.2.1.

Rendement
1
0,97



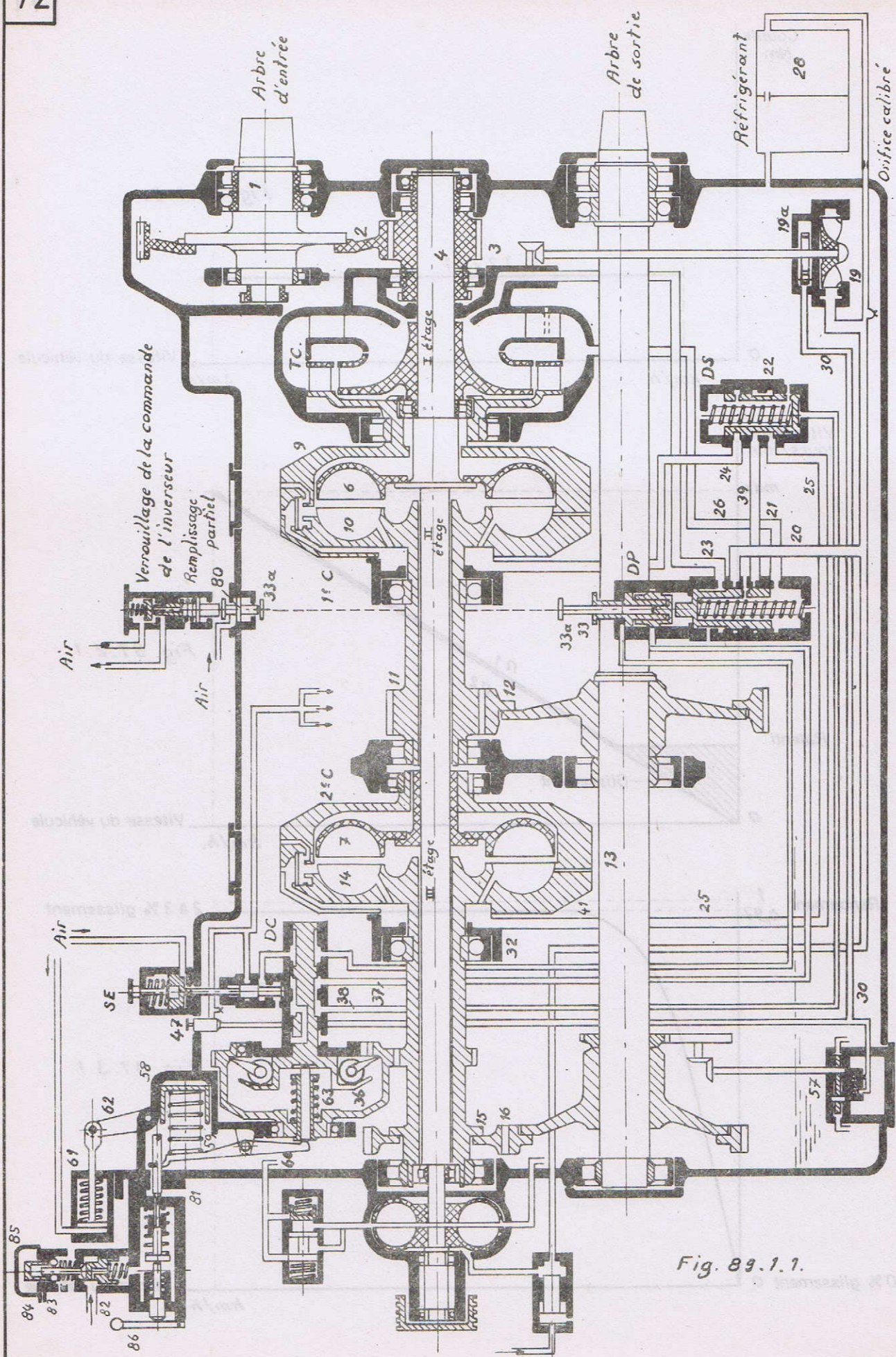


Fig. 89.1.1.

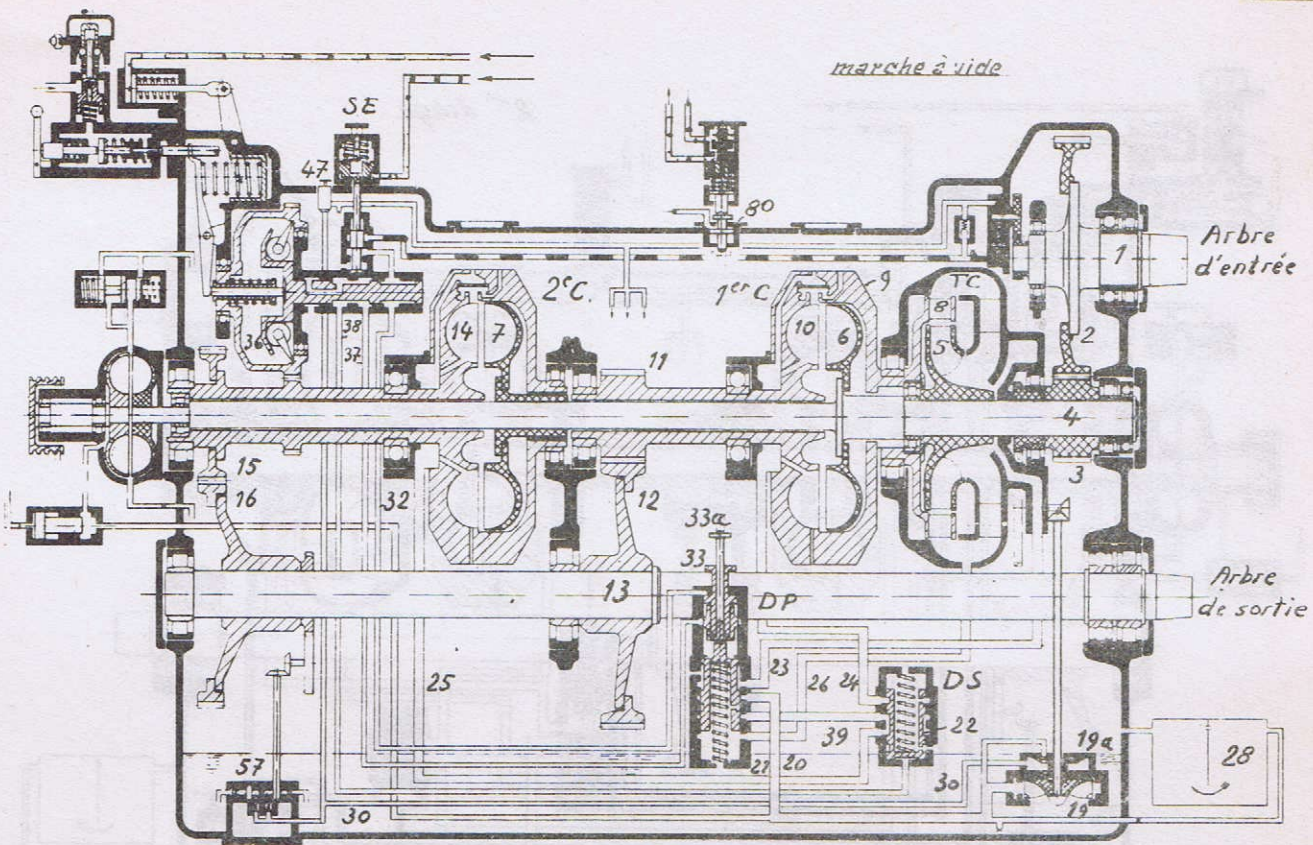


Fig. 89.2.1.

1^{er} Etage

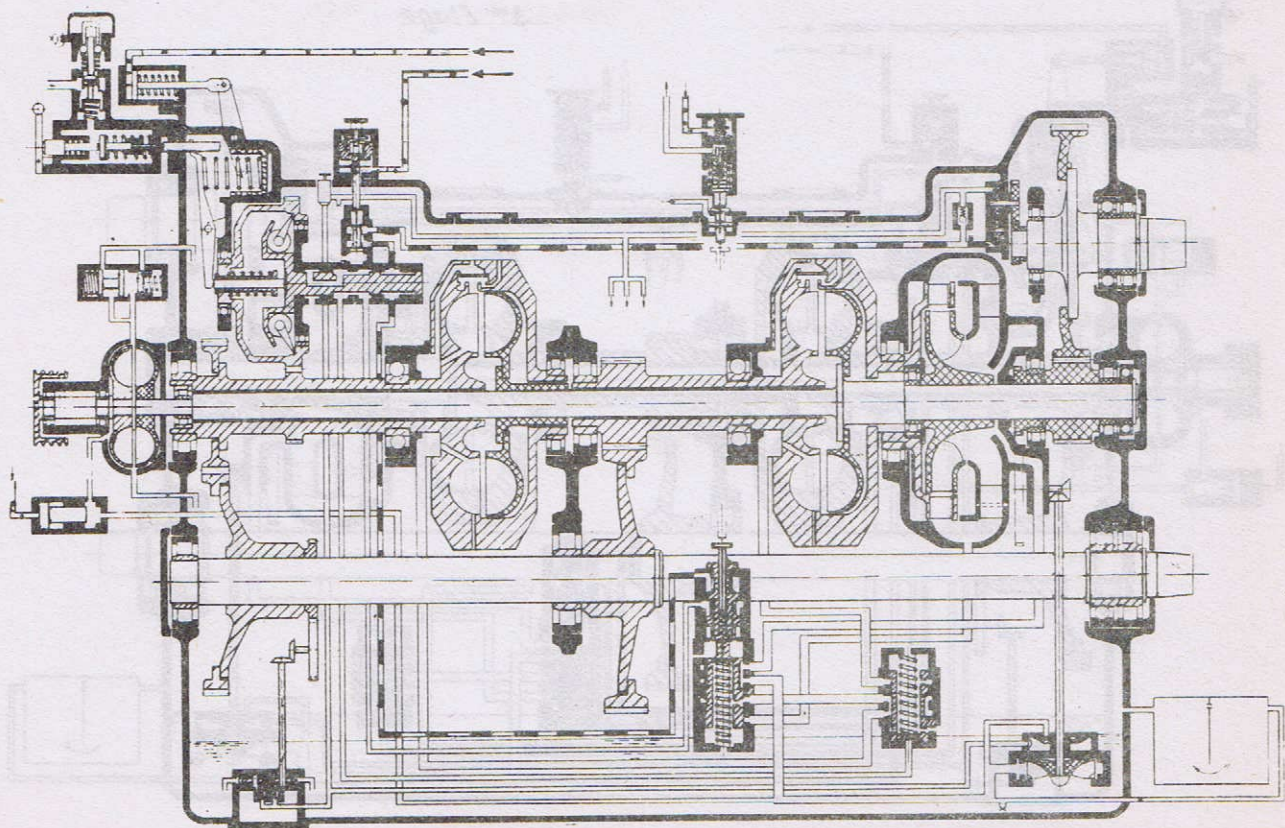


Fig. 89.2.2.

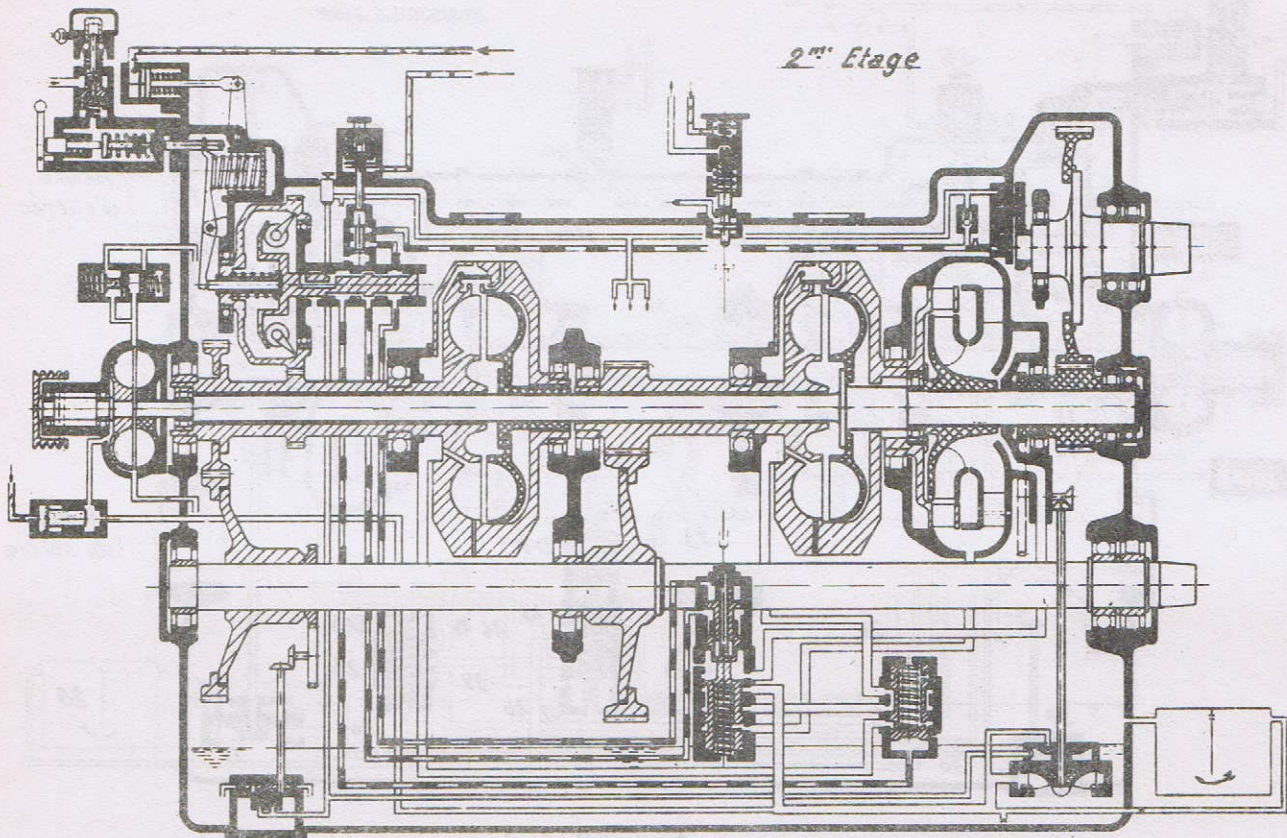


Fig. 89. 2.3.

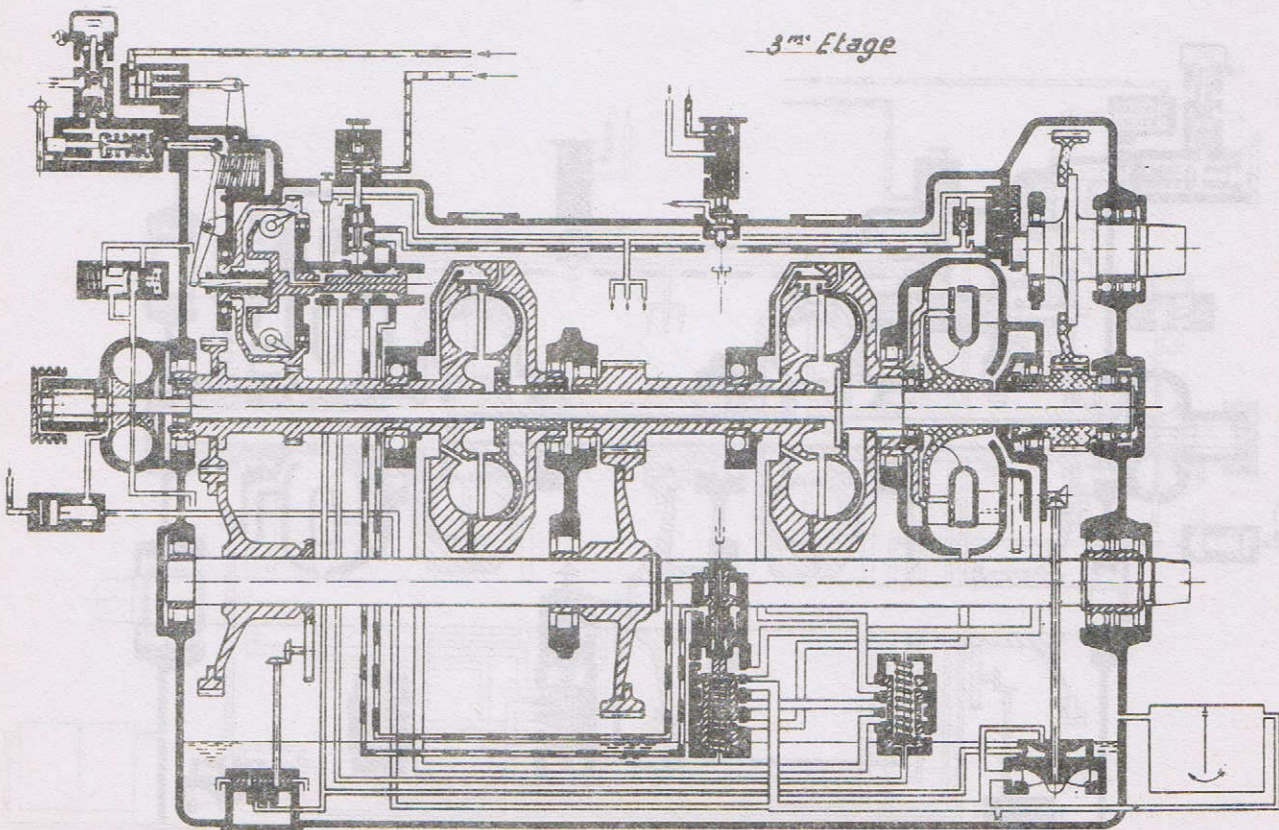


Fig. 89. 2.4.

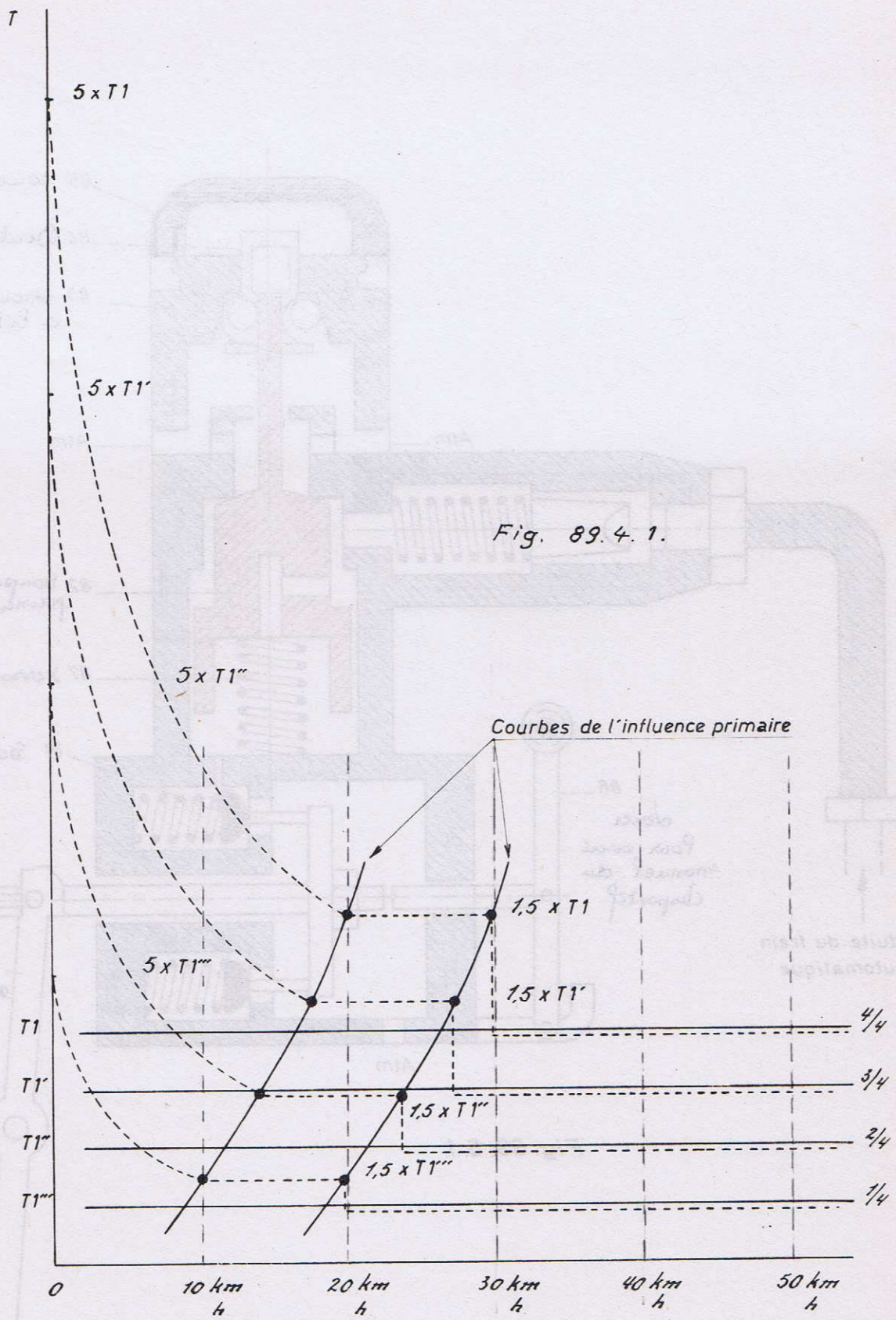


Fig. 89.4.1.

Courbes de l'influence primaire

$T1$ — Couple moteur
 $T2$ ---- Couple transmission

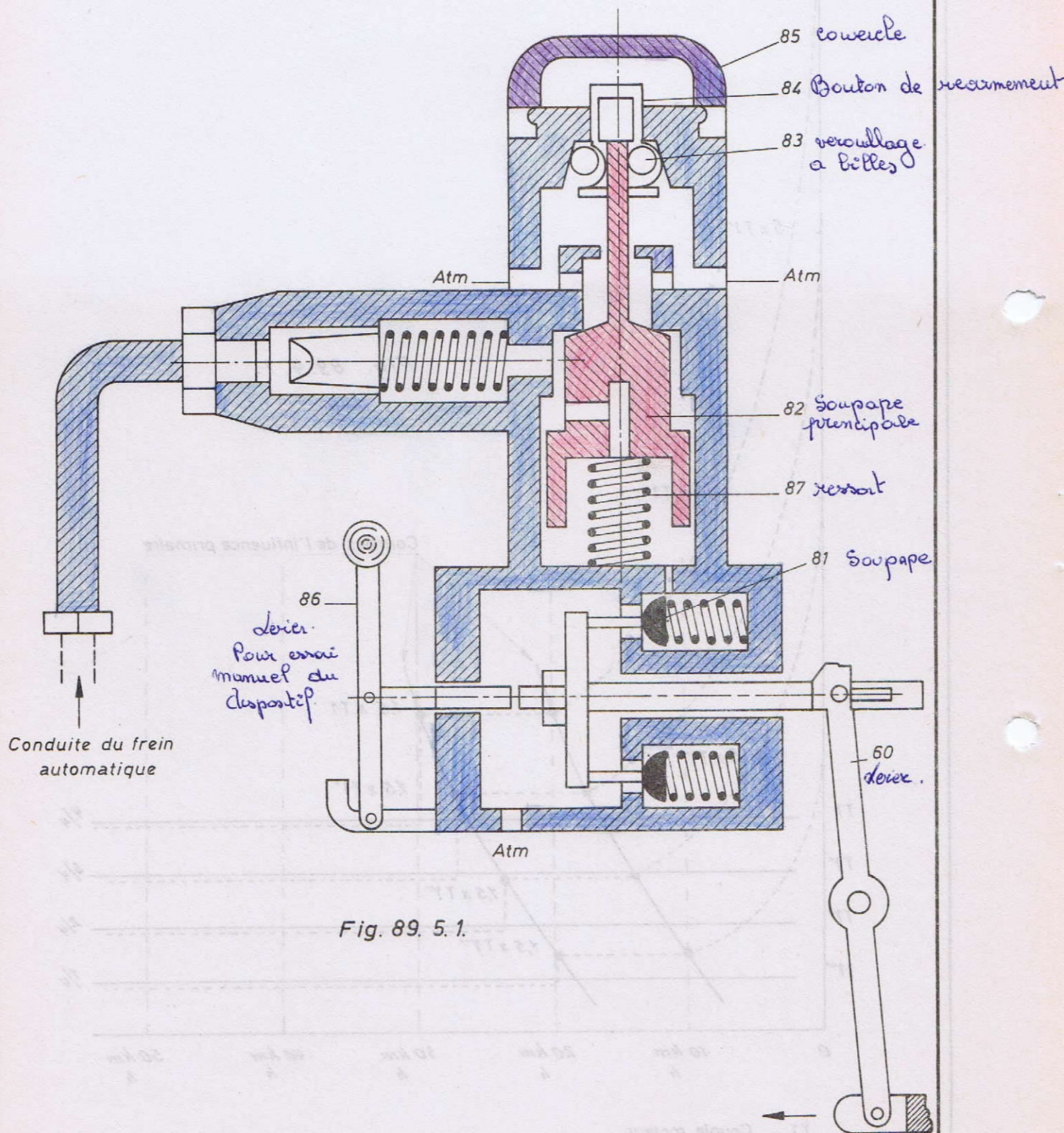


Fig. 89. 5.1.

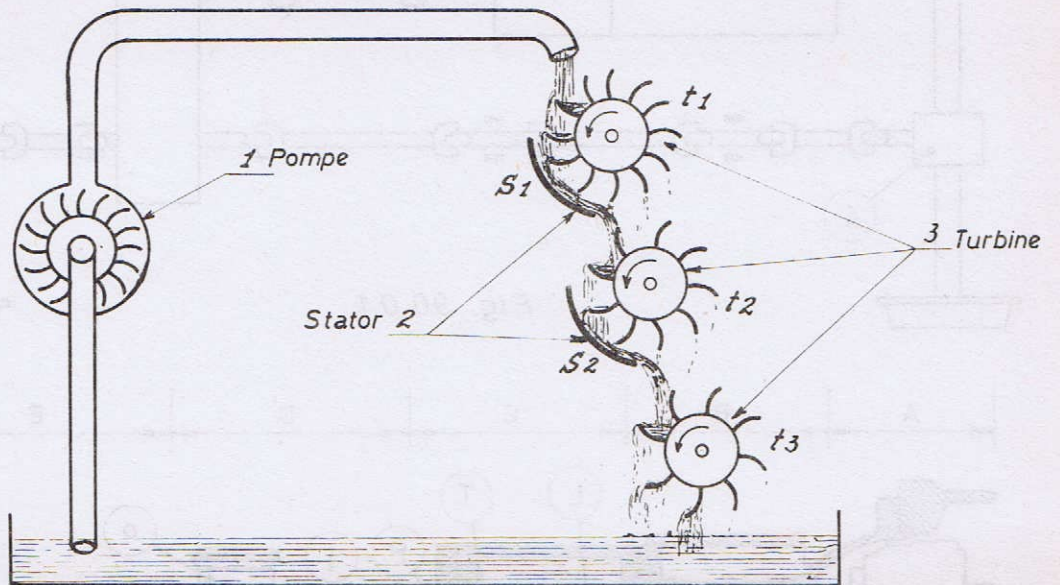


Fig. 89.6.1.

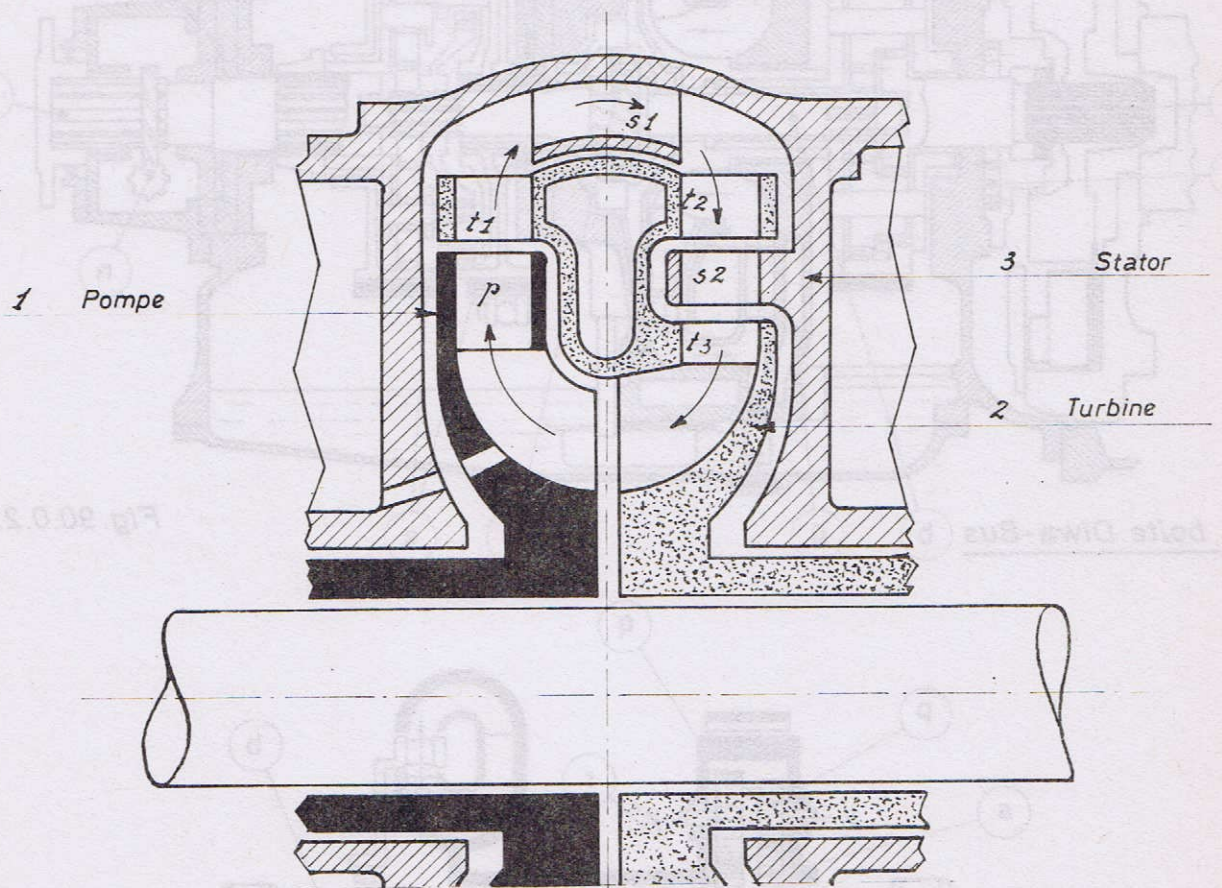
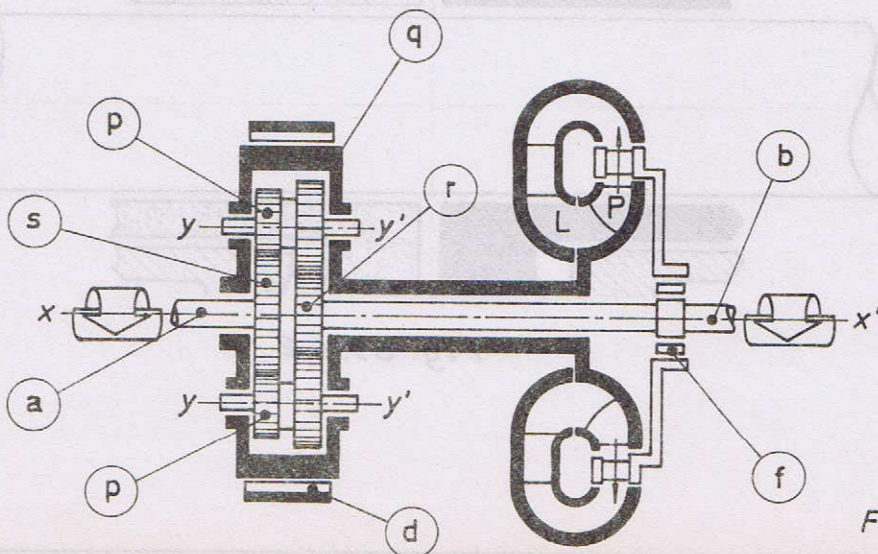
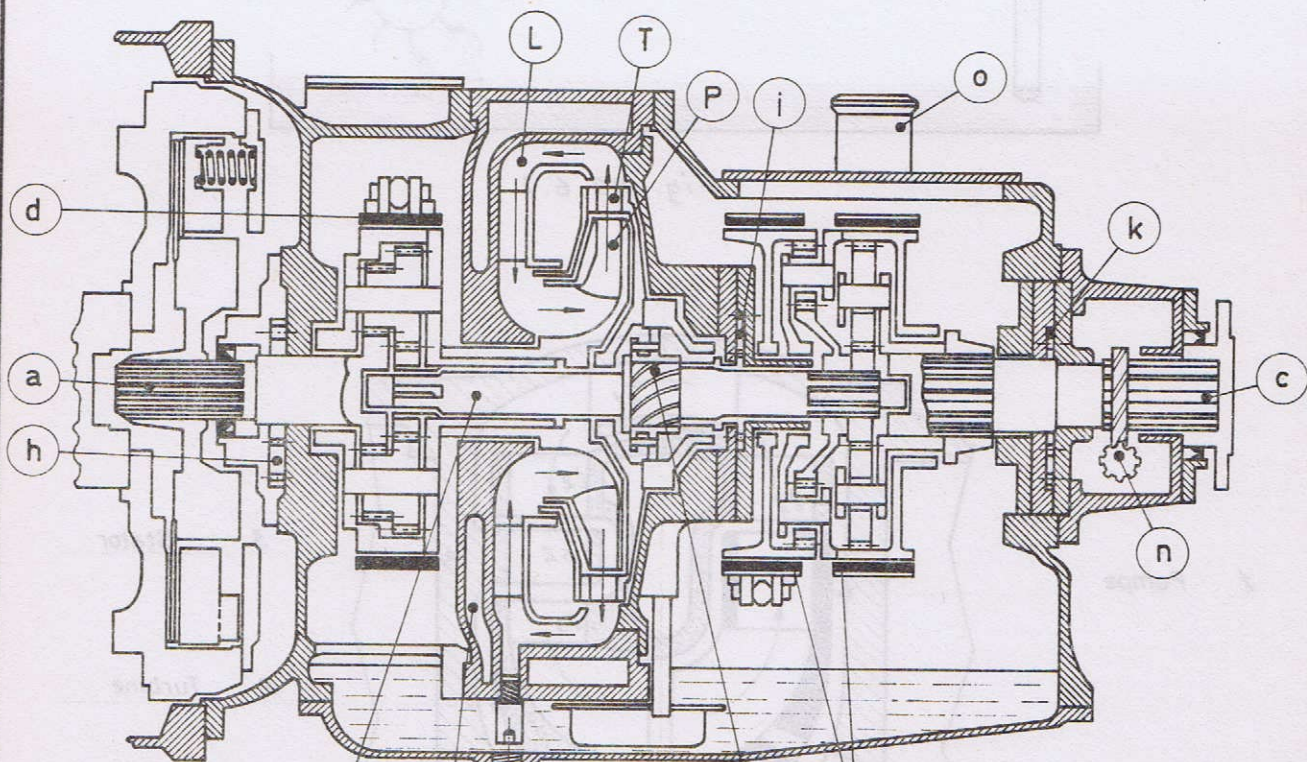
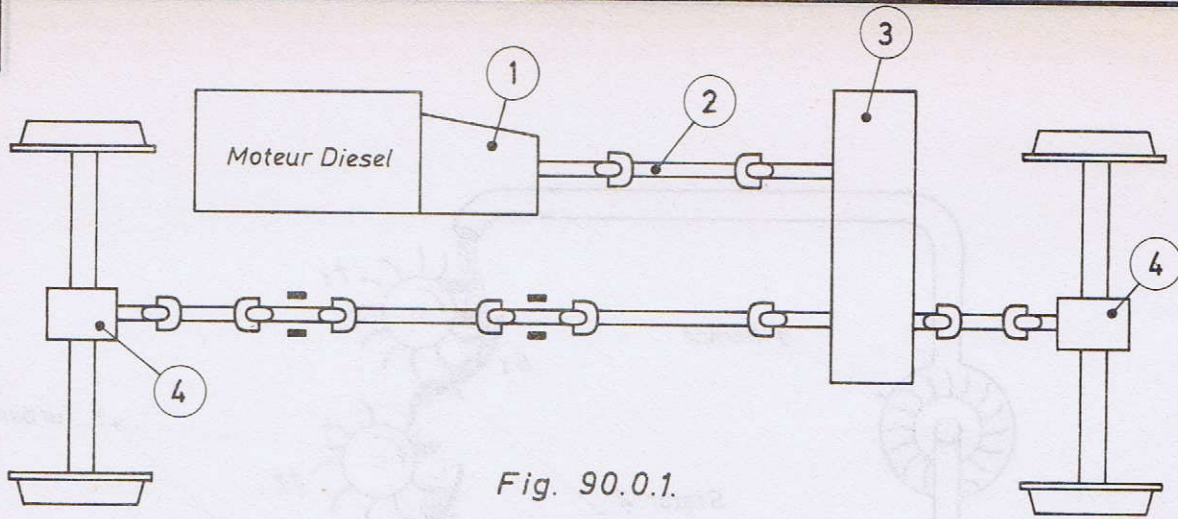


Fig. 89.6.2.



Le circuit hydraulique

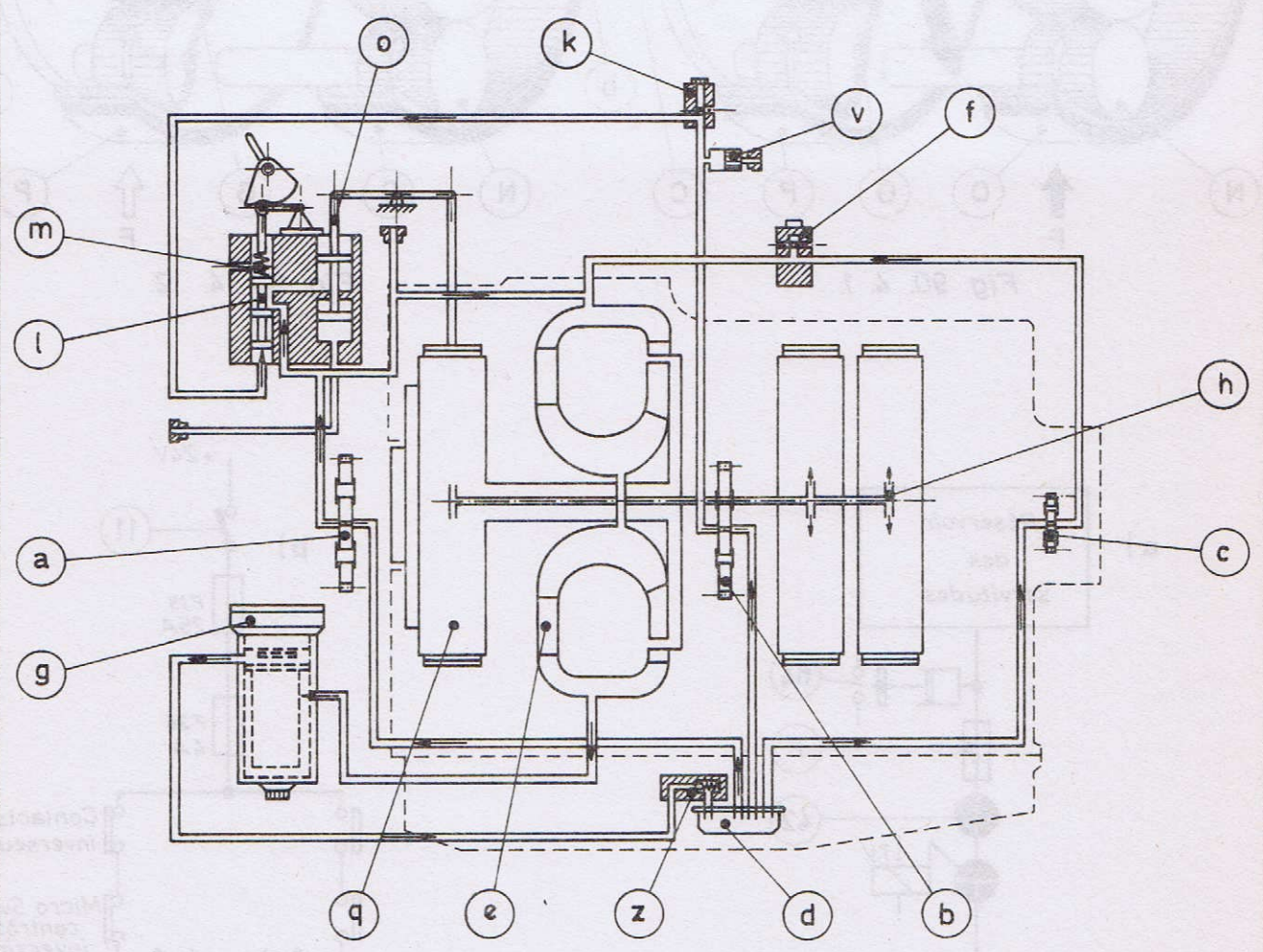


Fig. 90. 2. 1.

Sélection d'une gamme de vitesse

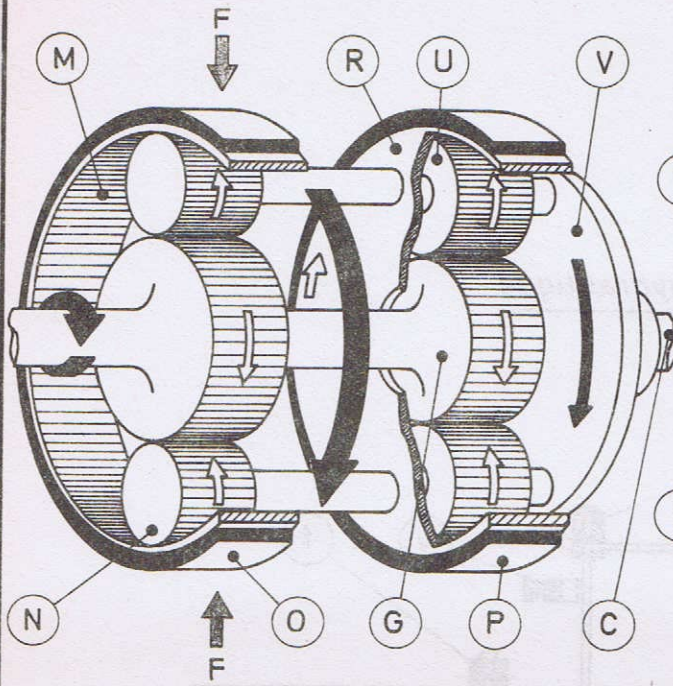


Fig. 90. 4. 1.

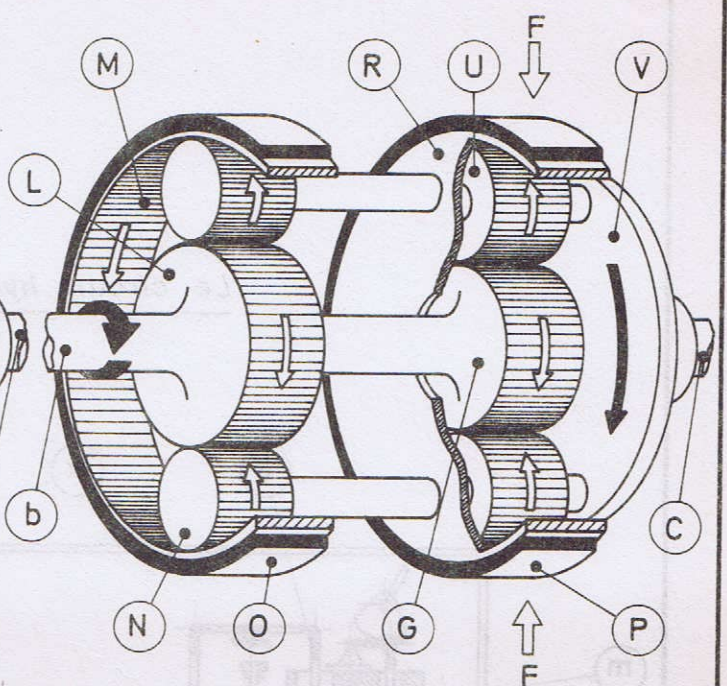


Fig. 90. 4. 2.

a)

Réservoir des servitudes

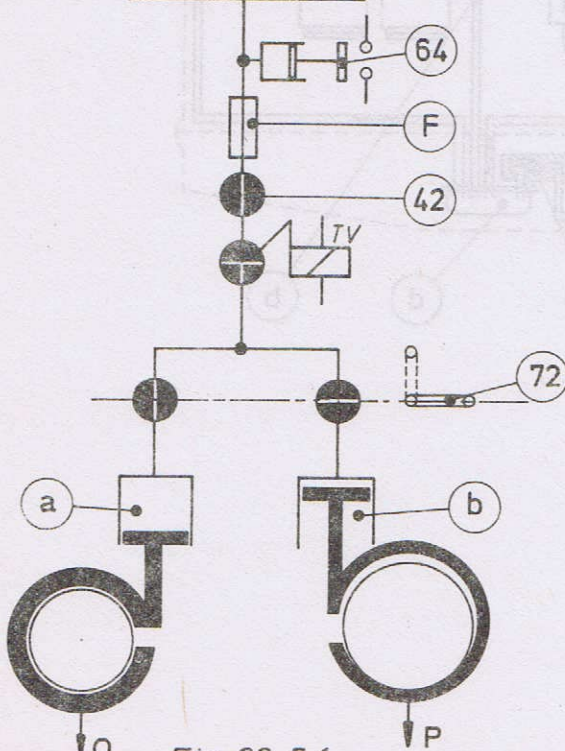


Fig. 90. 5.1.

b)

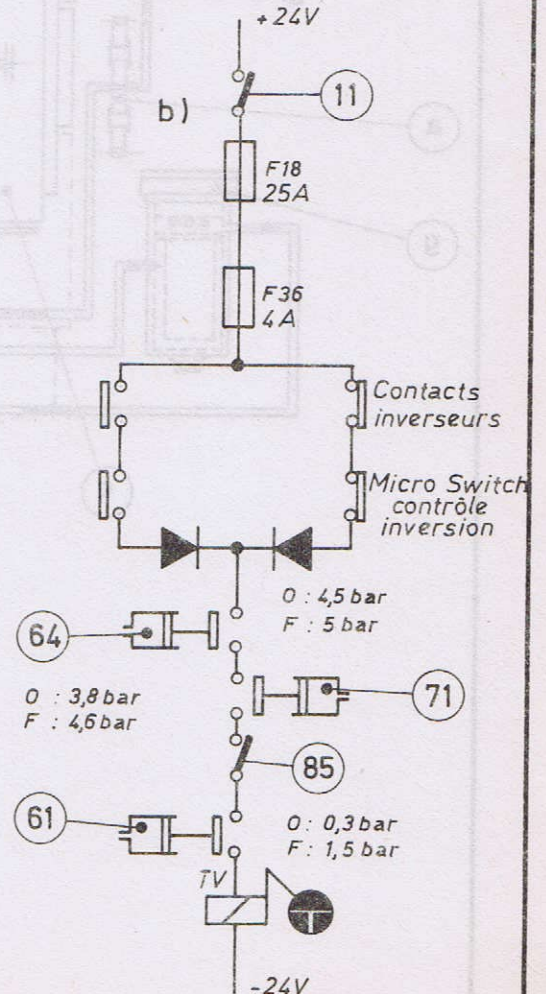


Fig. 90. 5.2.

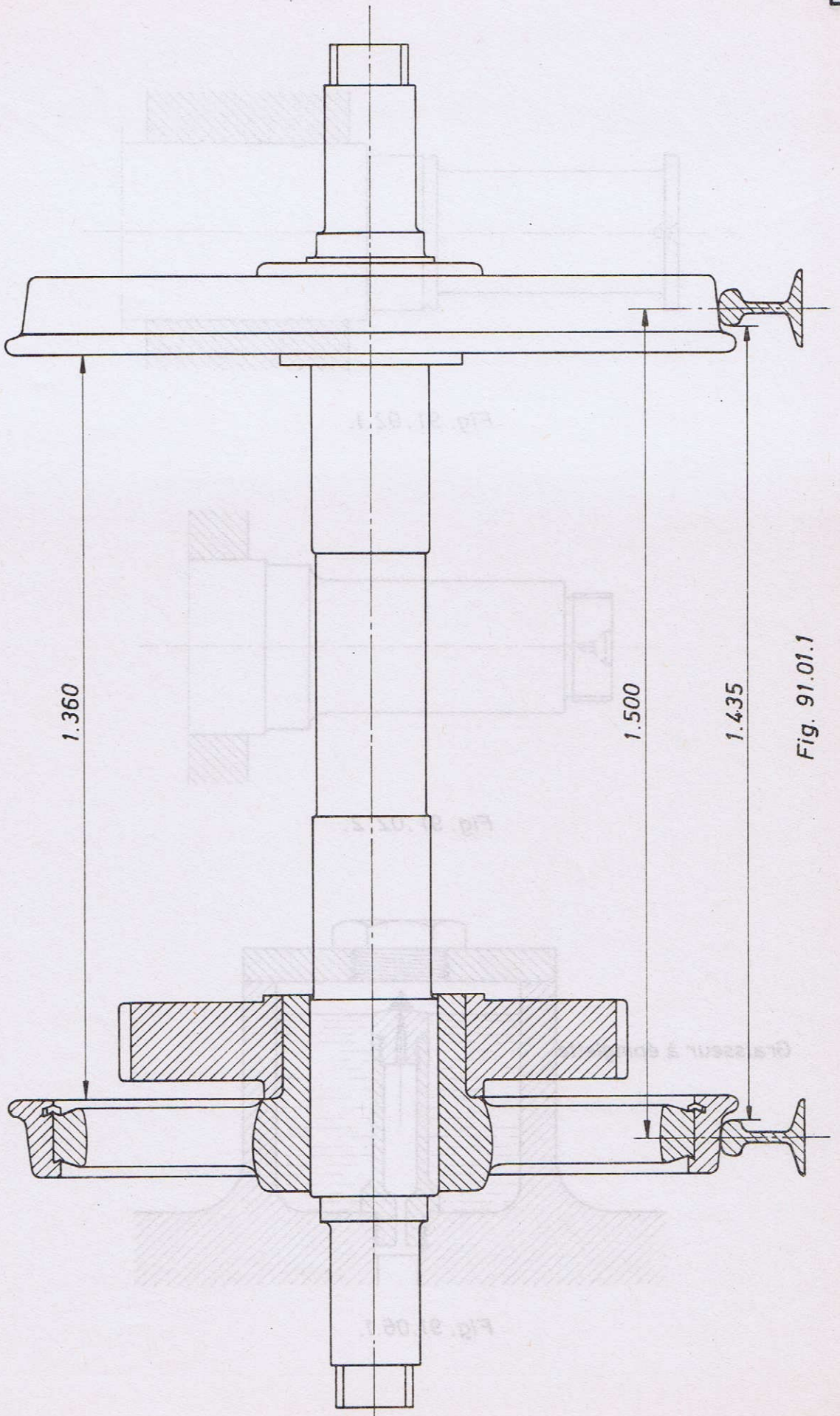


Fig. 91.01.1

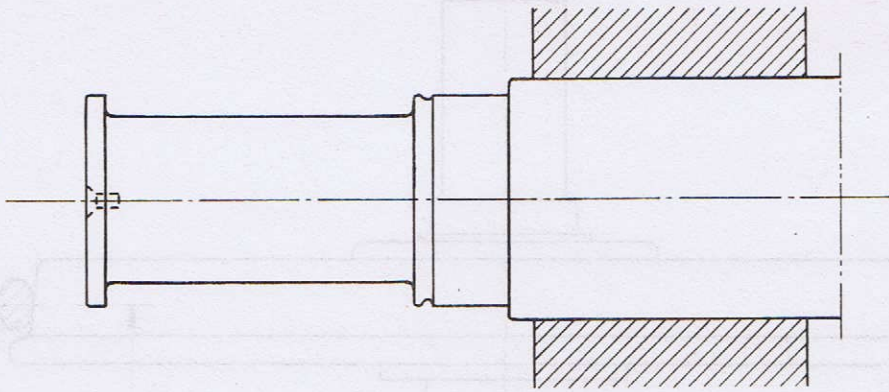


Fig. 91.02.1.

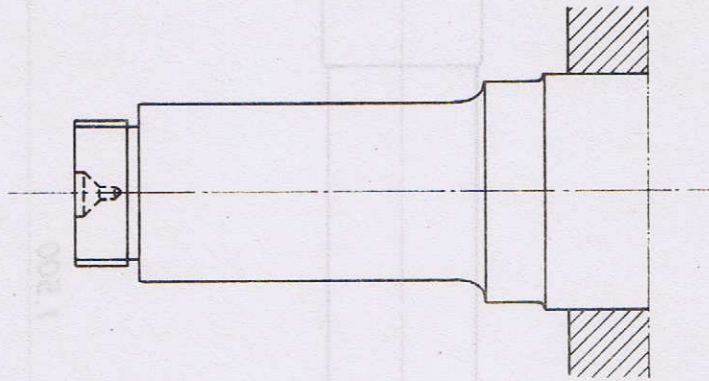


Fig. 91.02.2.

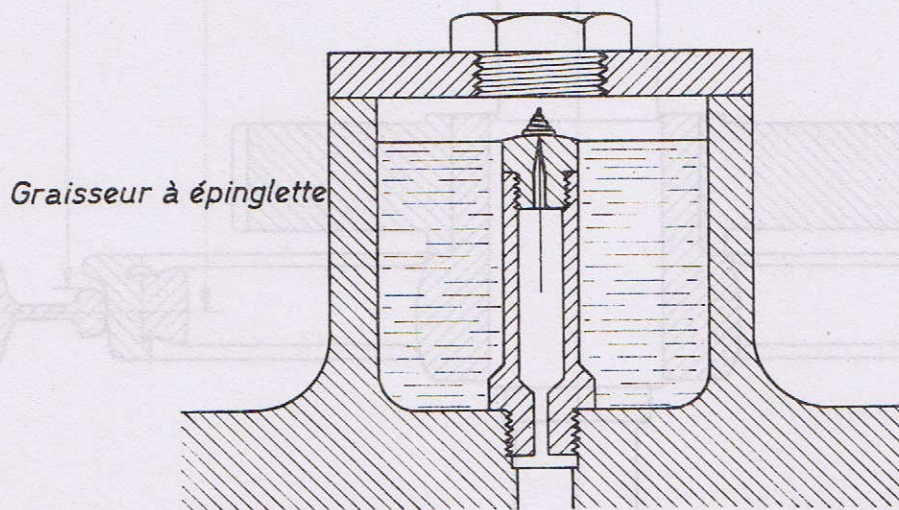


Fig. 91.06.1.

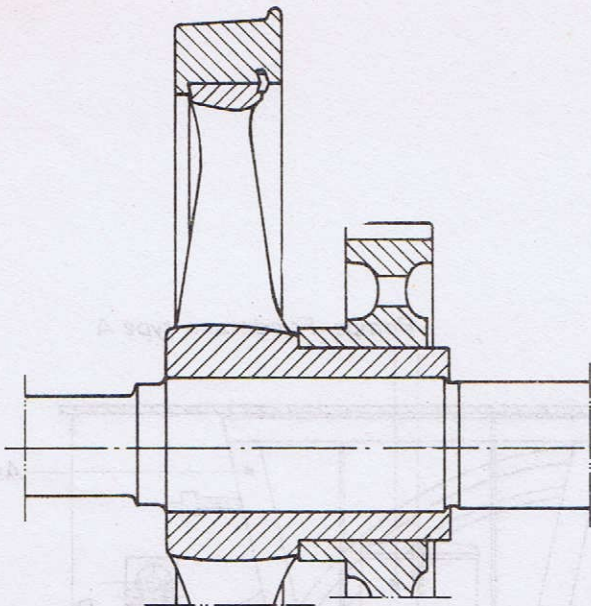


Fig. 91.03.1.

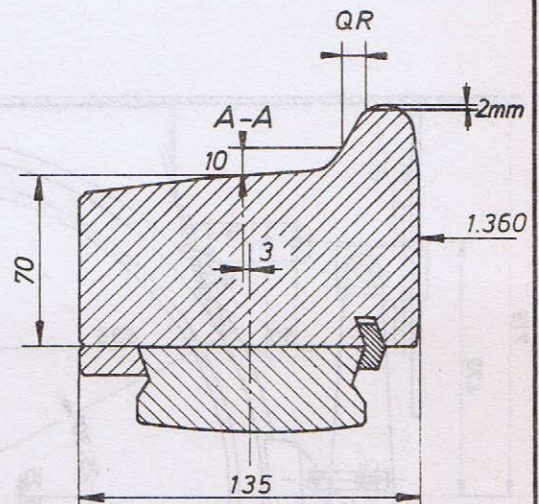


Fig. 91.04.1.

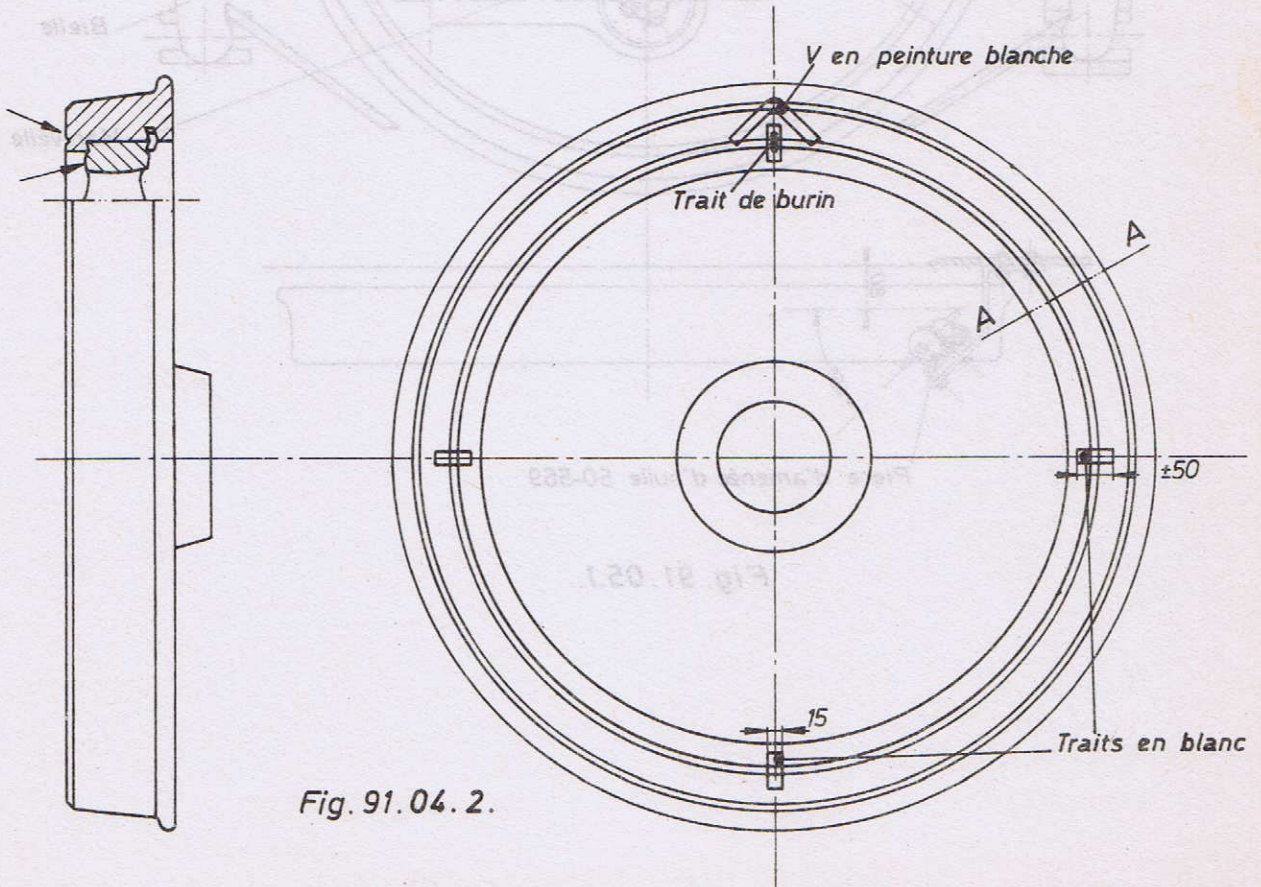


Fig. 91.04.2.

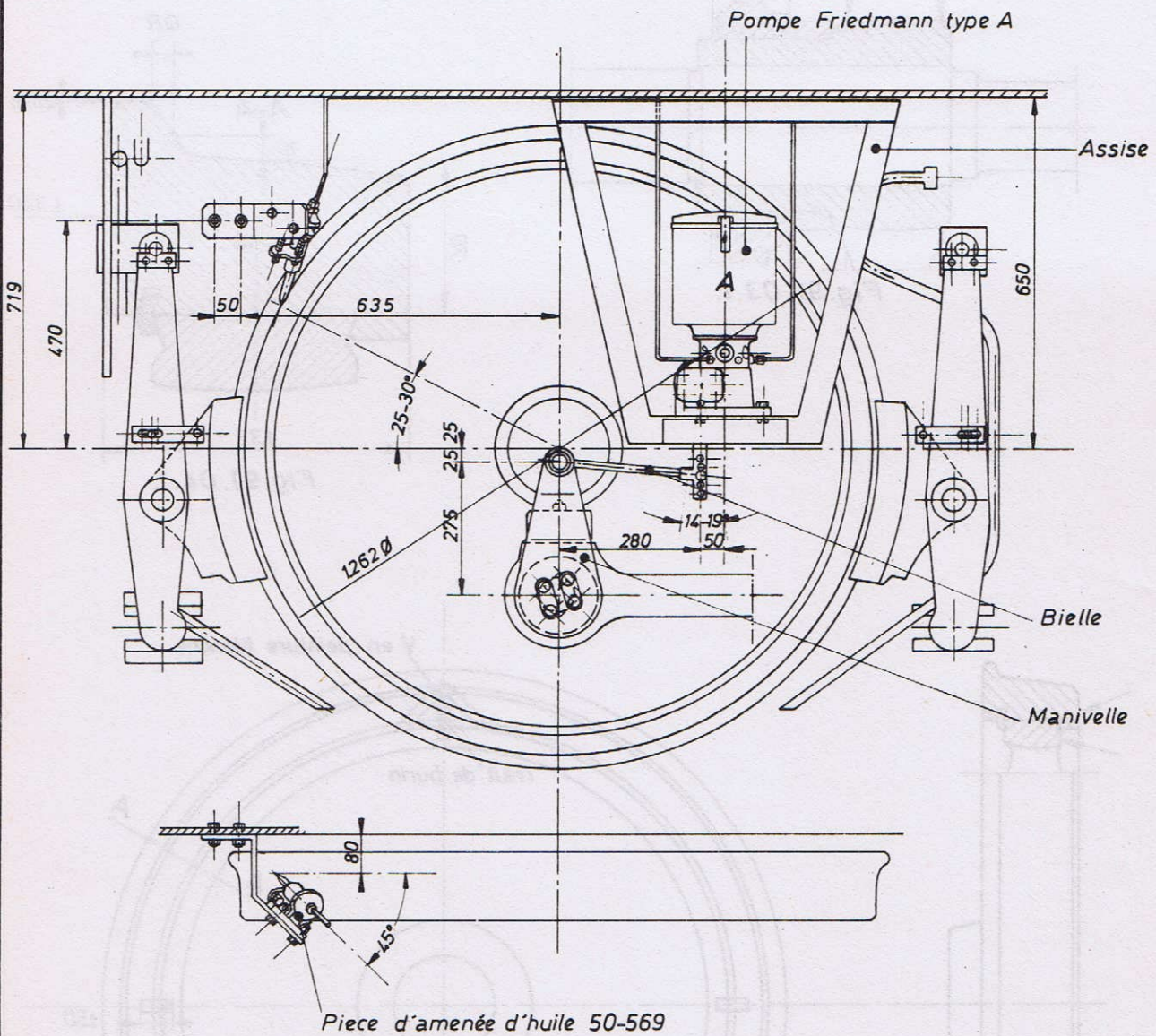


Fig. 91.05.1.

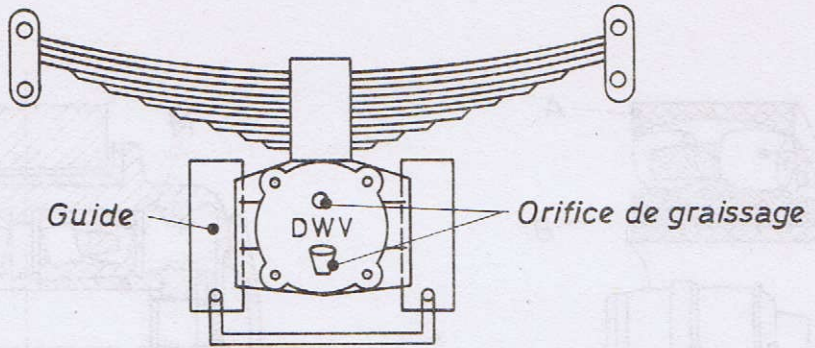


Fig. 91.07.1

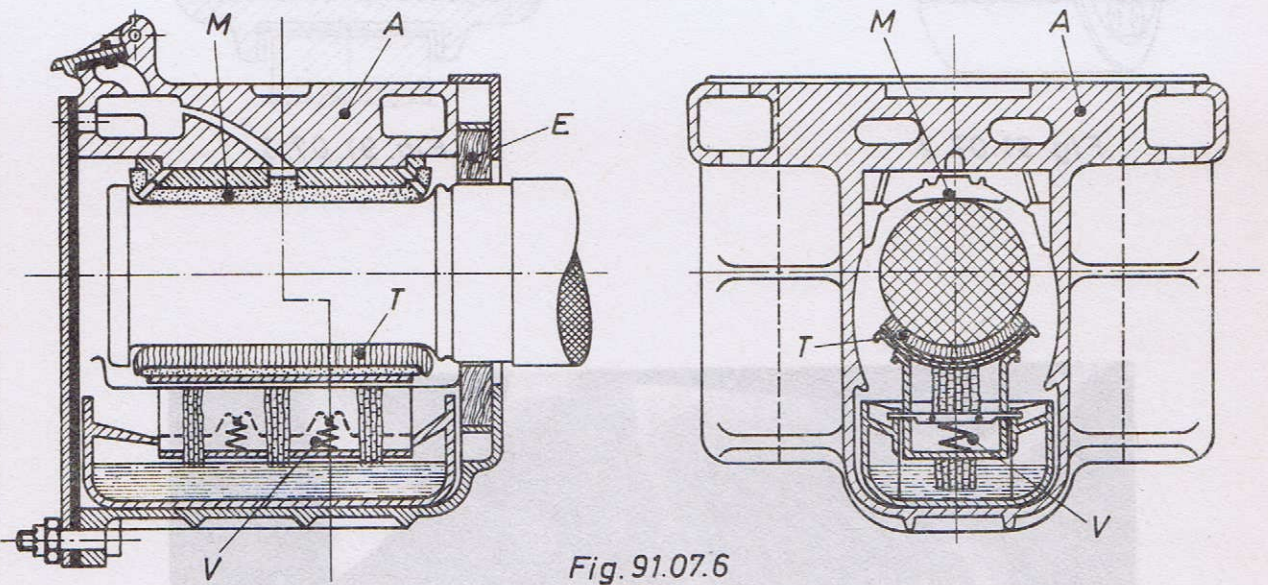


Fig. 91.07.6

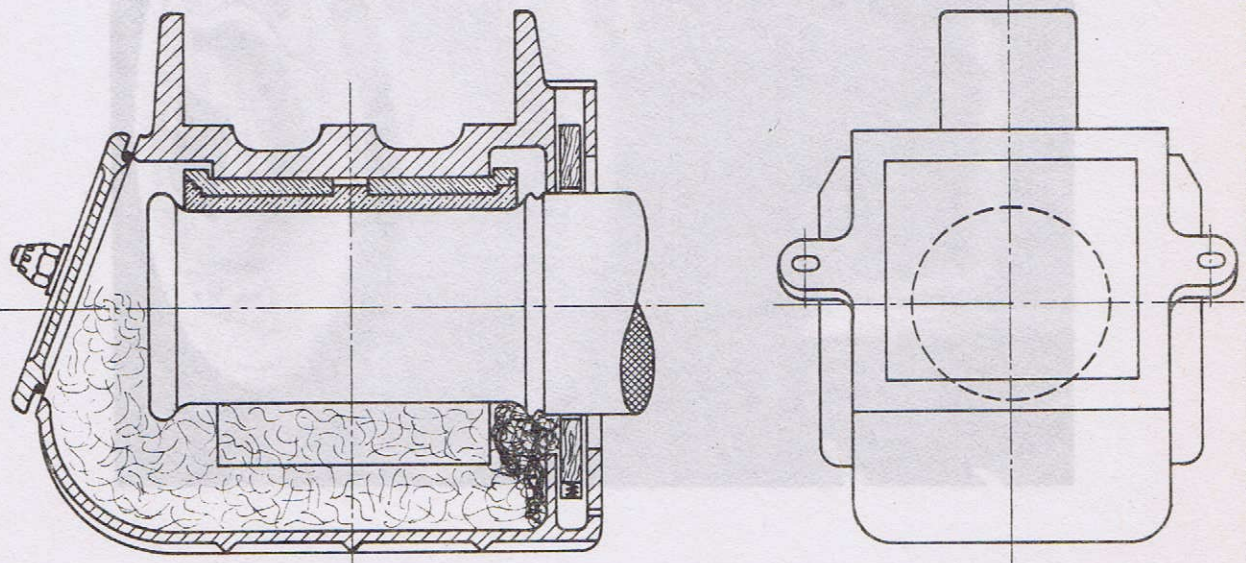


Fig. 91.07.7

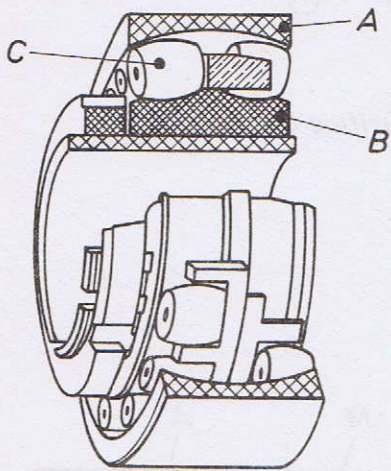


Fig. 91.07.2

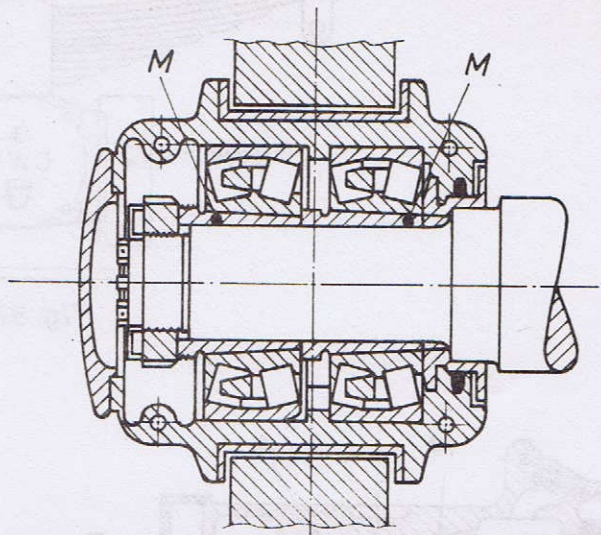


Fig. 91.07.3

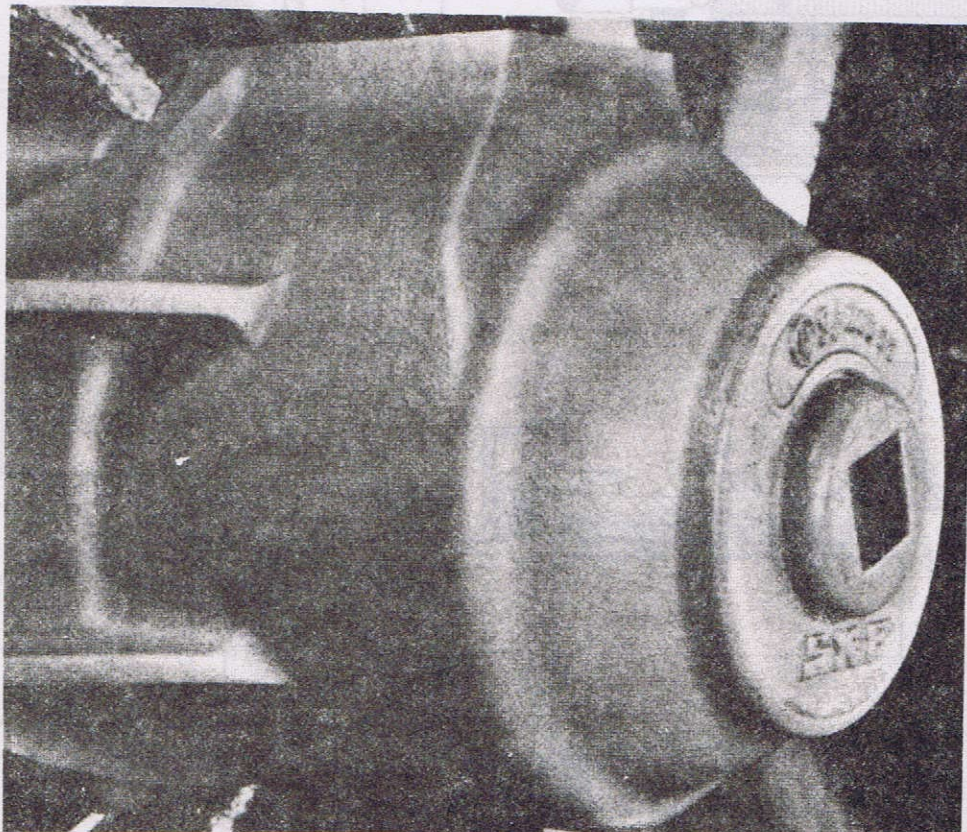


Fig. 91.07.4

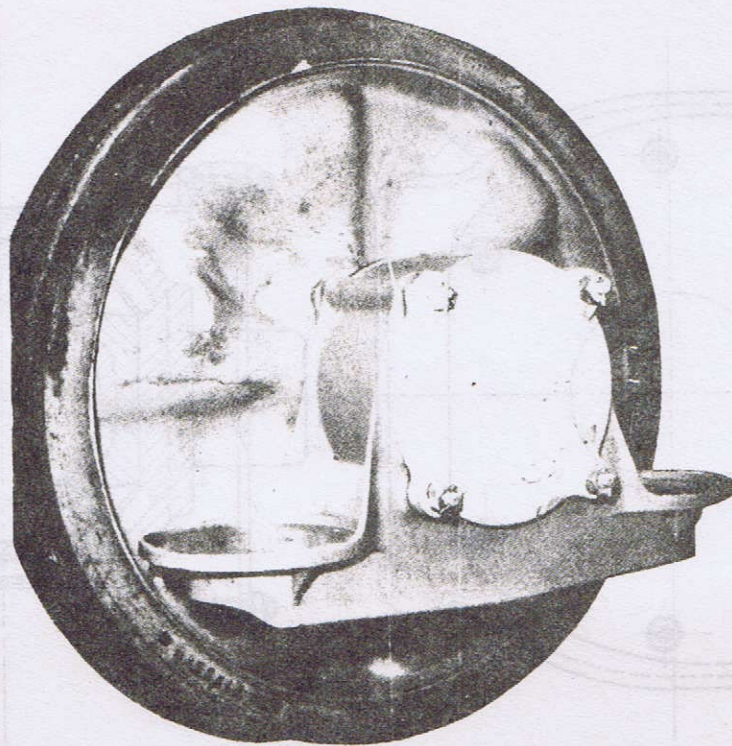
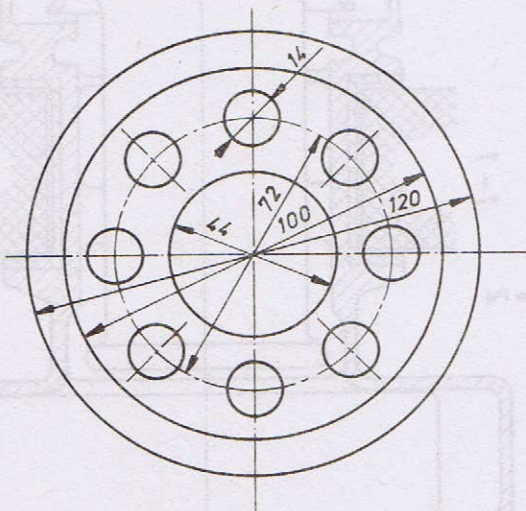
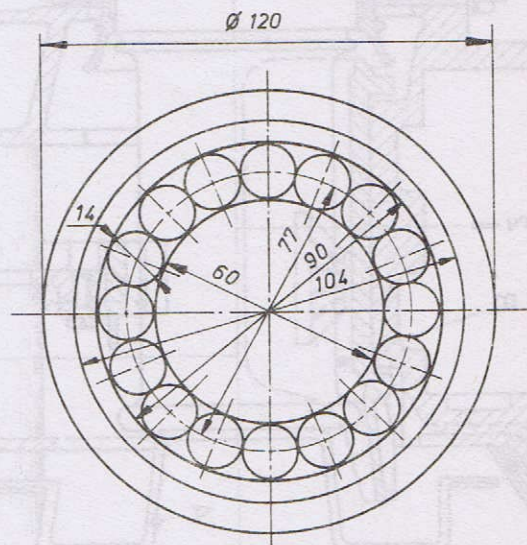


Fig. 91.07.5

F.S./S.N.C.B. - Réseau.



S.N.C.F. Réseau.



Les deux repères sont peints en blanc et le point central est peint complètement en blanc.

Fig. 91.09.1.

ISOTHERMOS

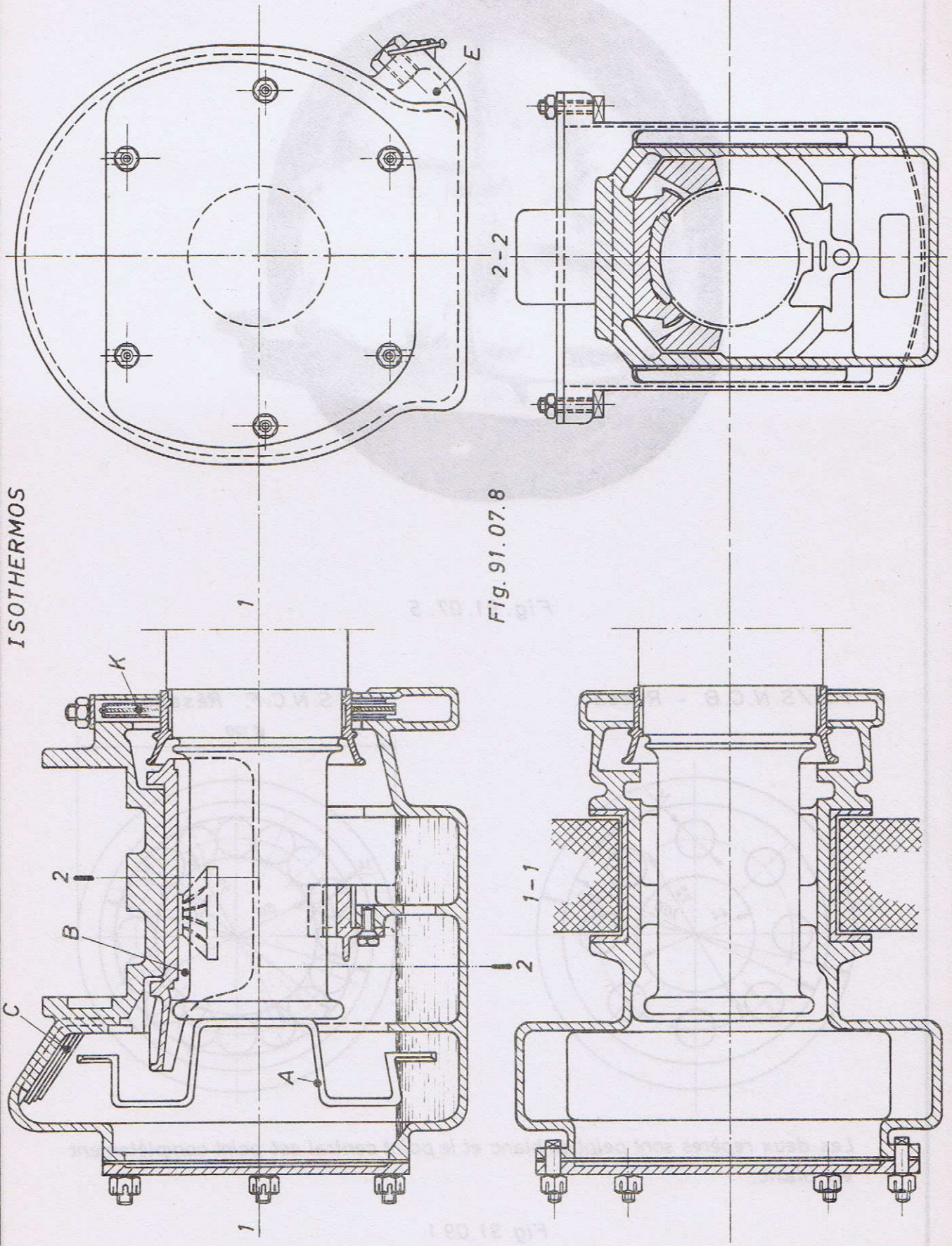


Fig. 91.07.8

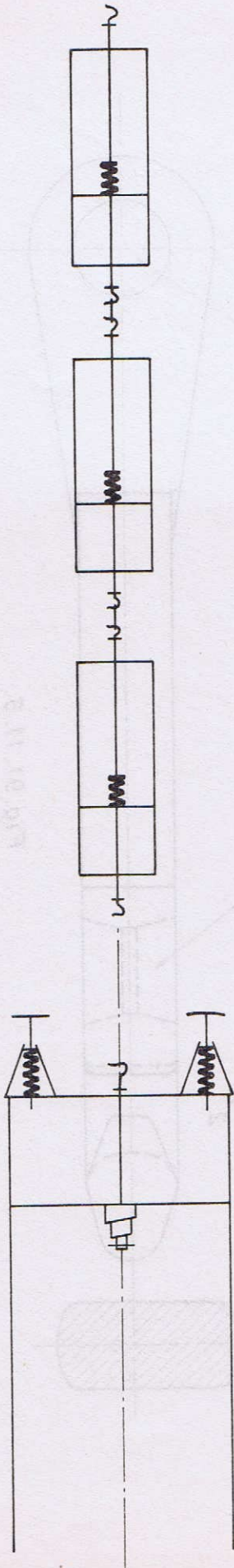


Fig. 91.11.1

Fig. 91.11.3

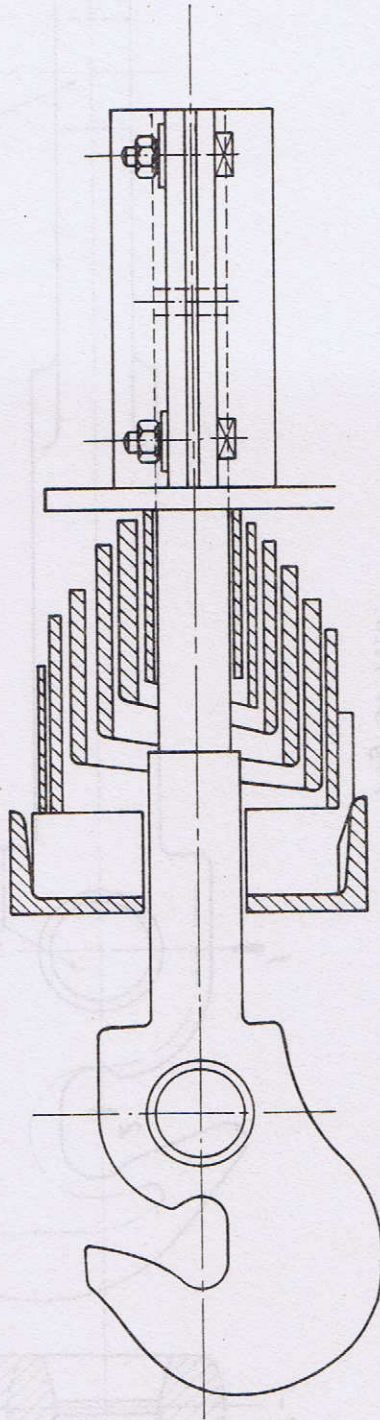


Fig. 91.11.2

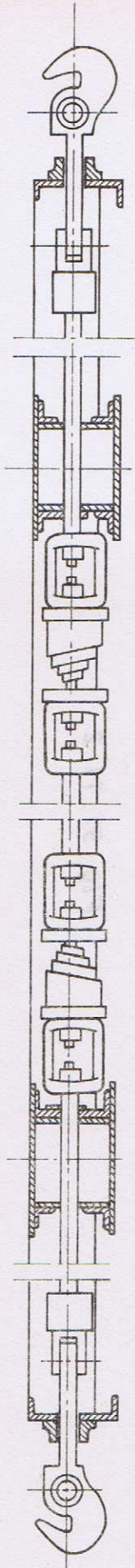


Fig. 91.11.4.

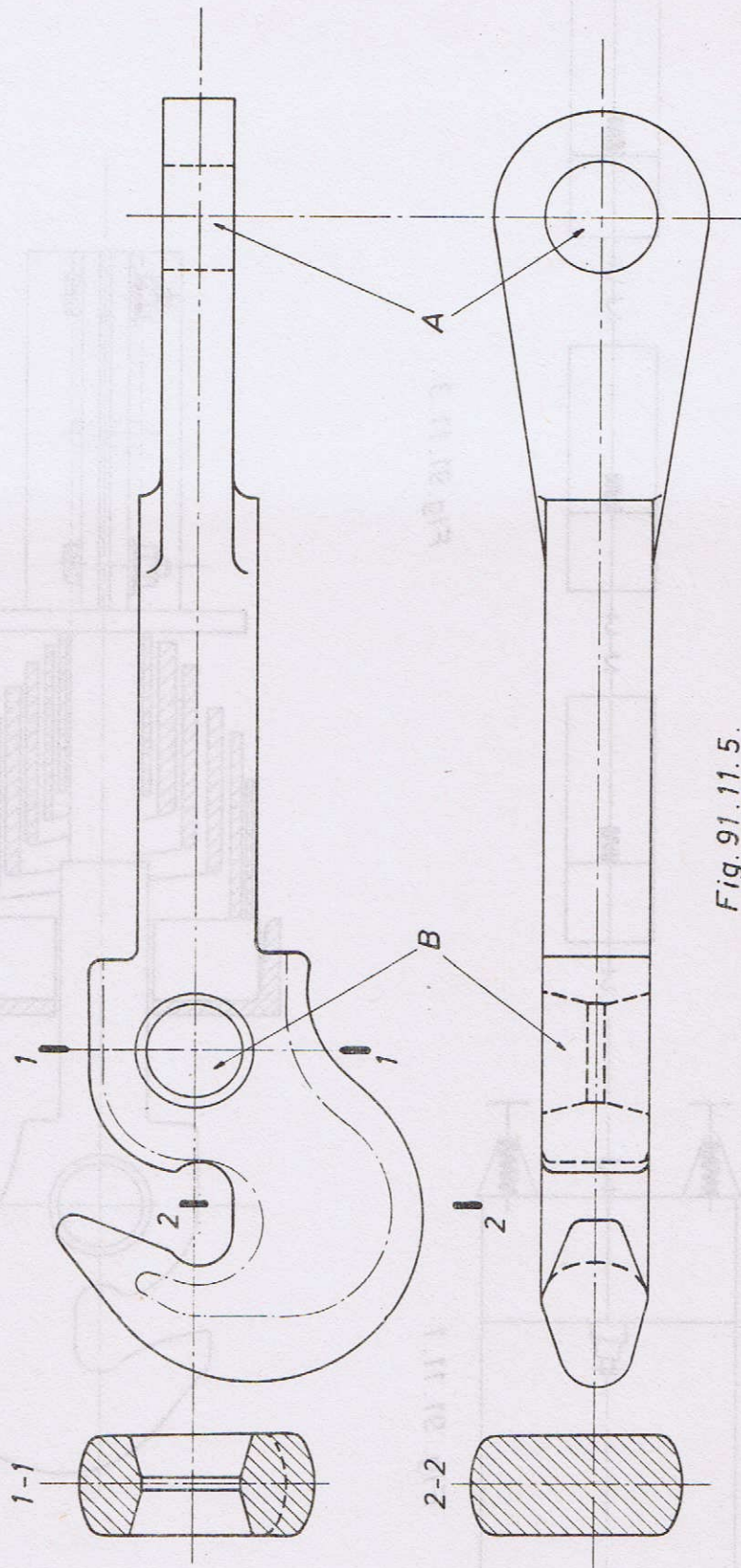


Fig. 91.11.5.

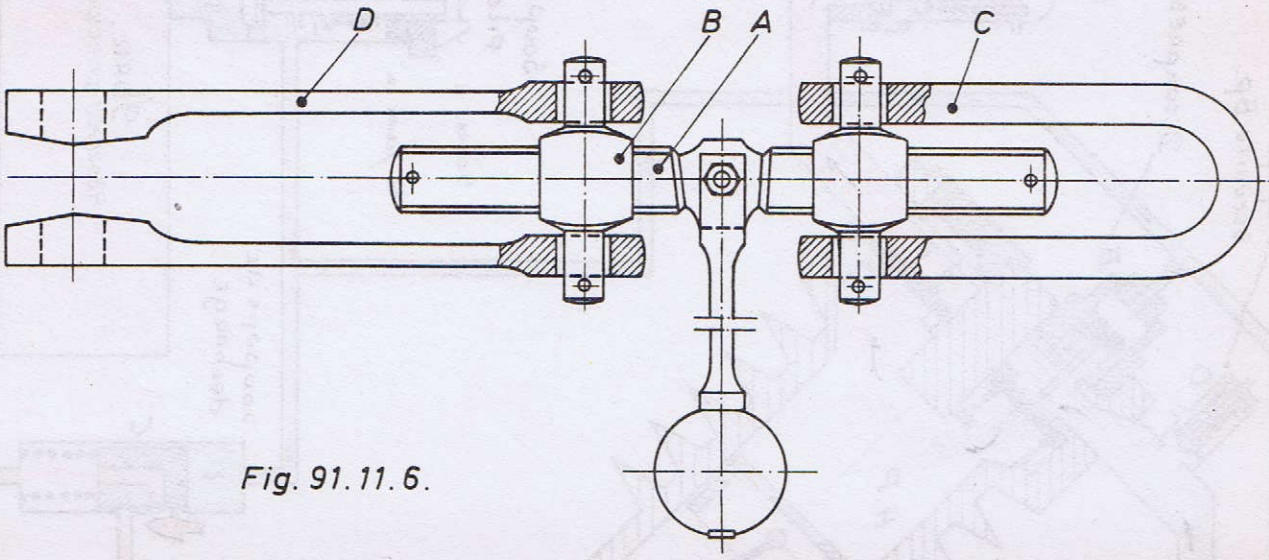


Fig. 91.11.6.

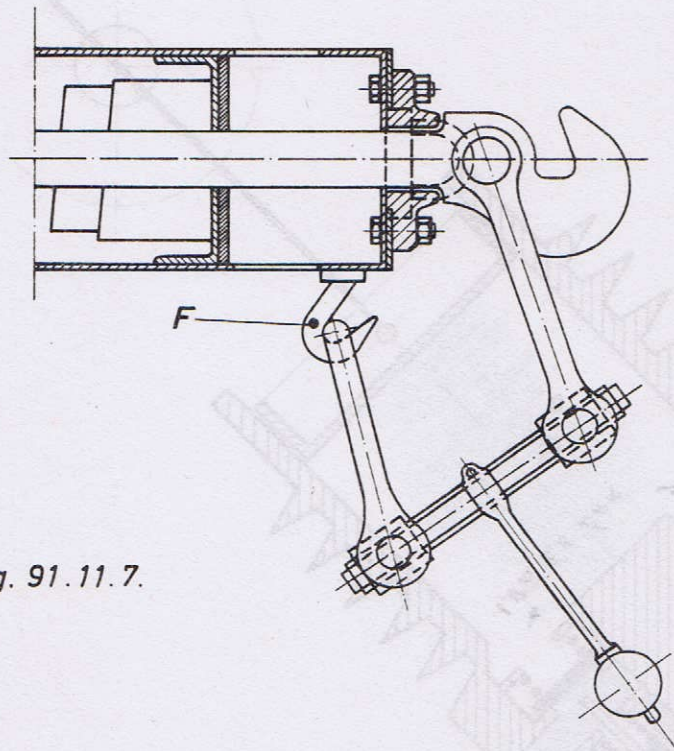


Fig. 91.11.7.

Handwritten notes in Russian:
D - диаметр стержня
C - диаметр штока
F - диаметр штока
B - диаметр штока
A - диаметр штока
C - диаметр штока
D - диаметр стержня

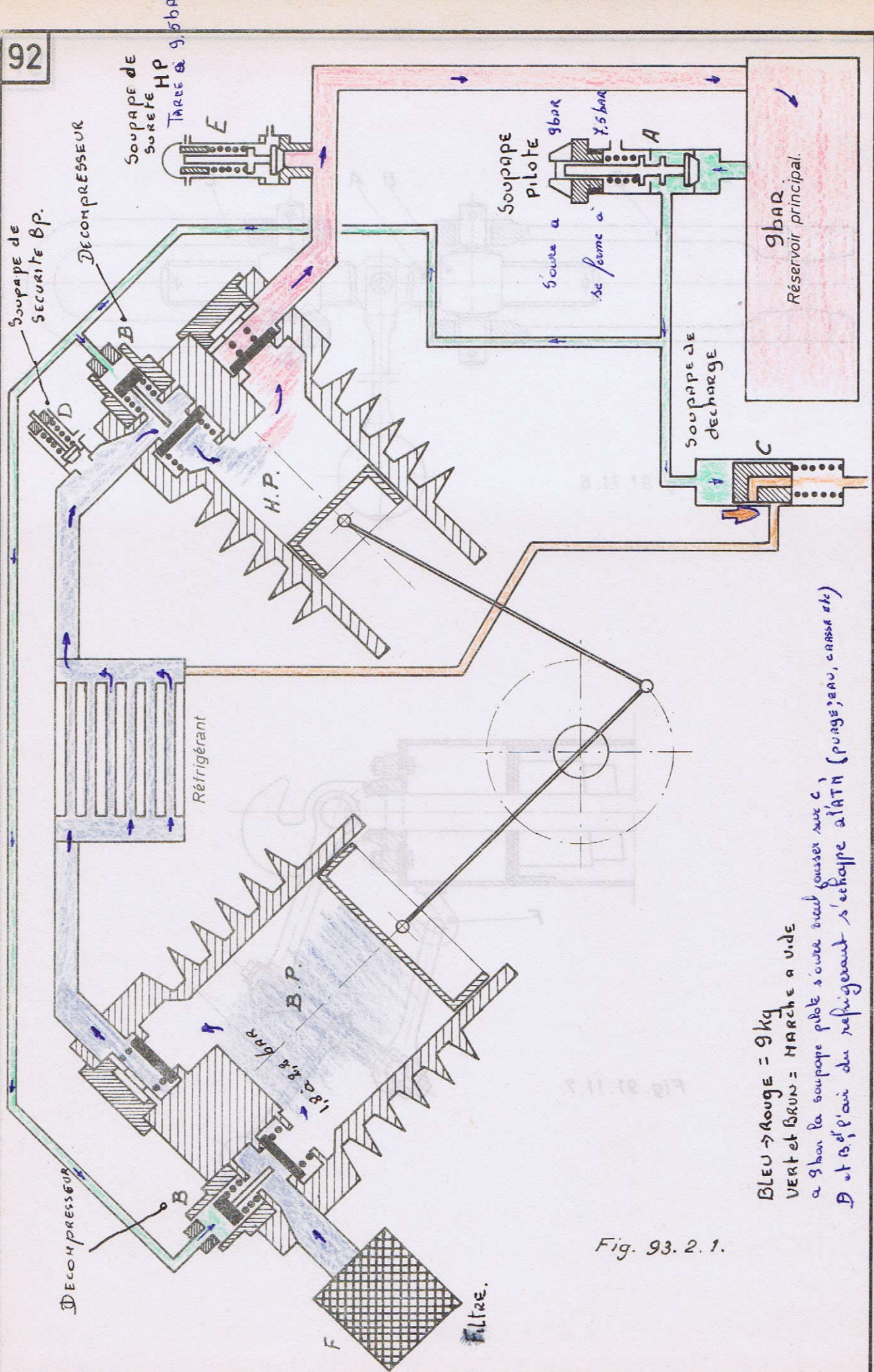
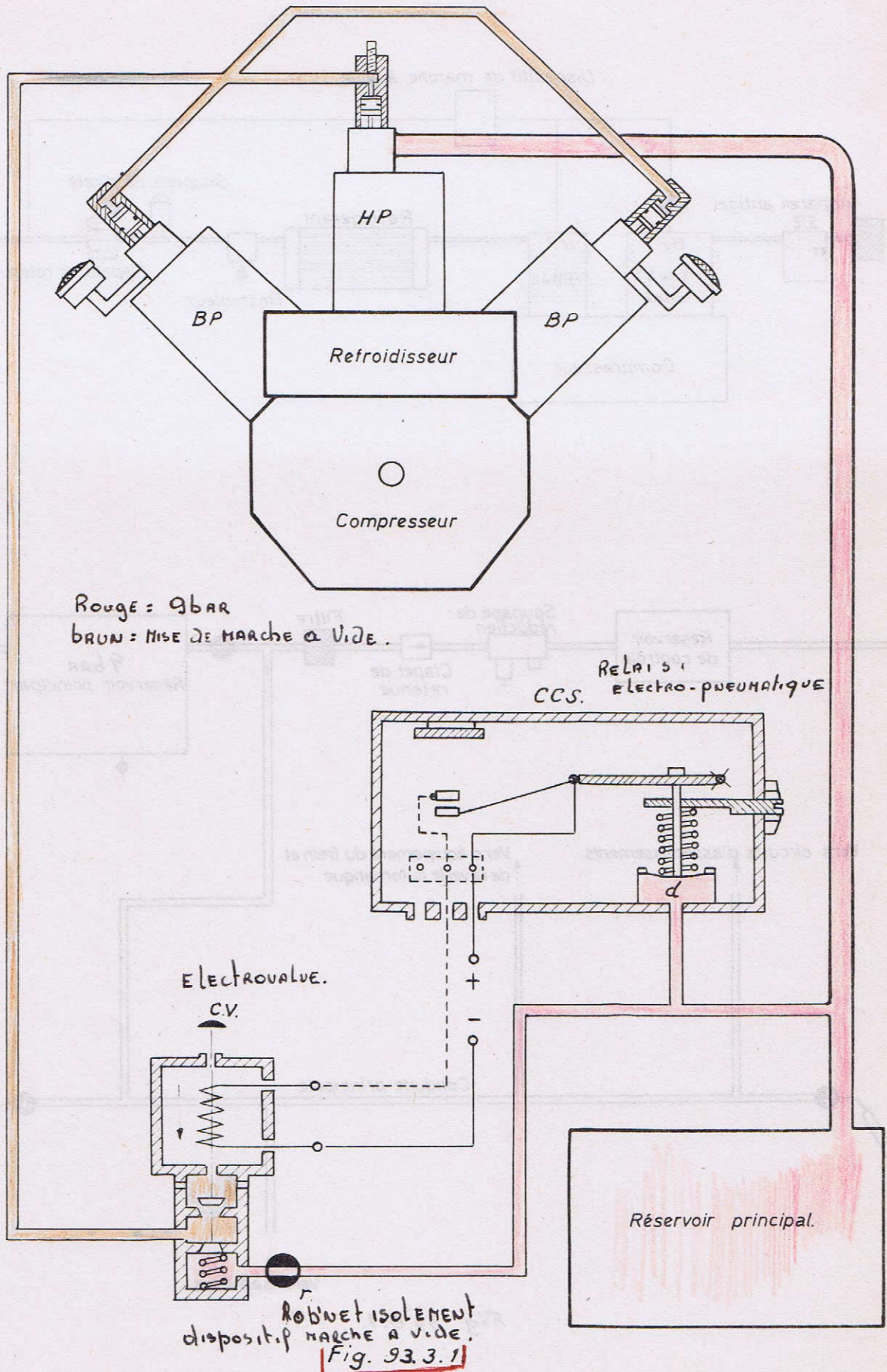


Fig. 93. 2. 1.



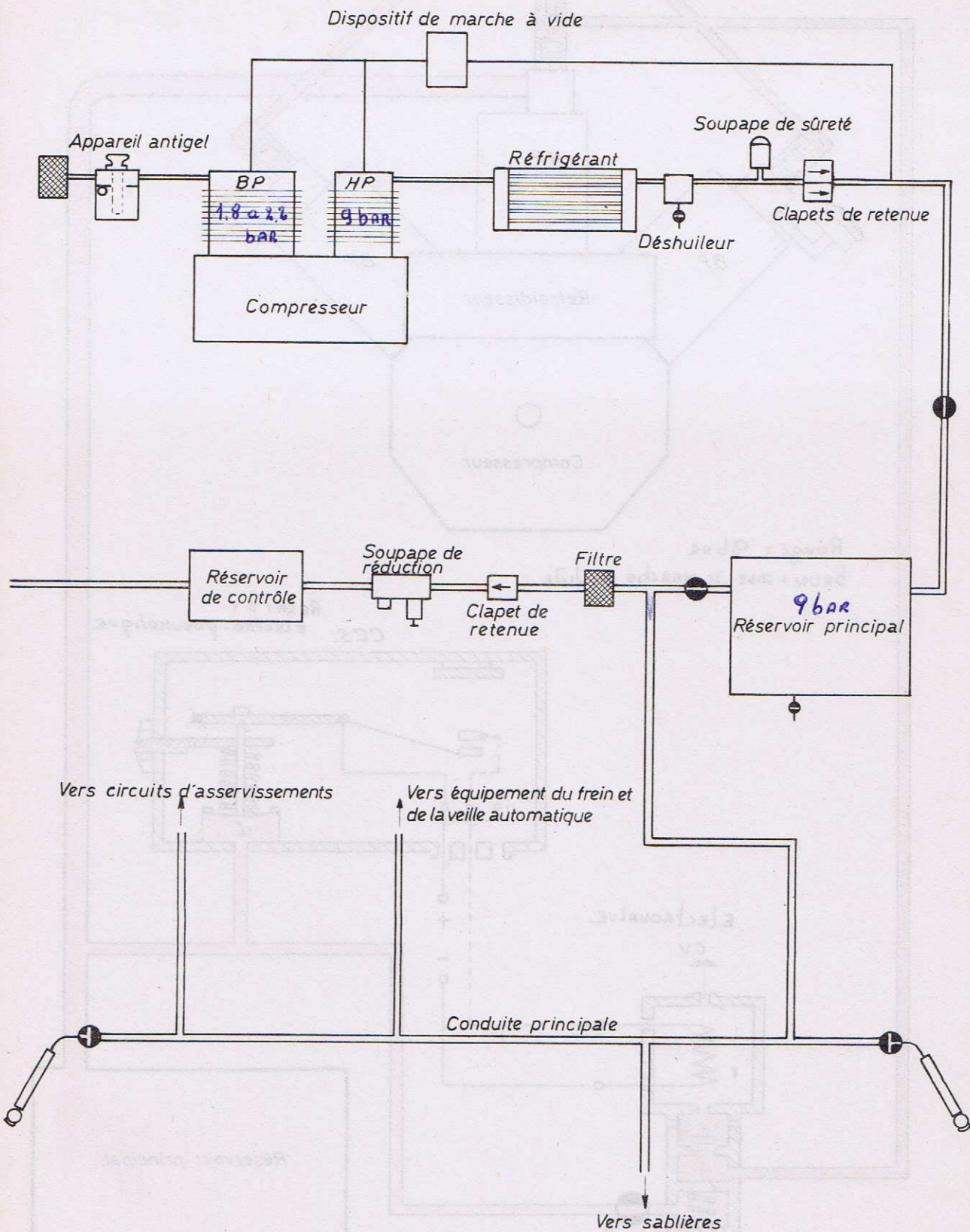


Fig. 94.0.1.

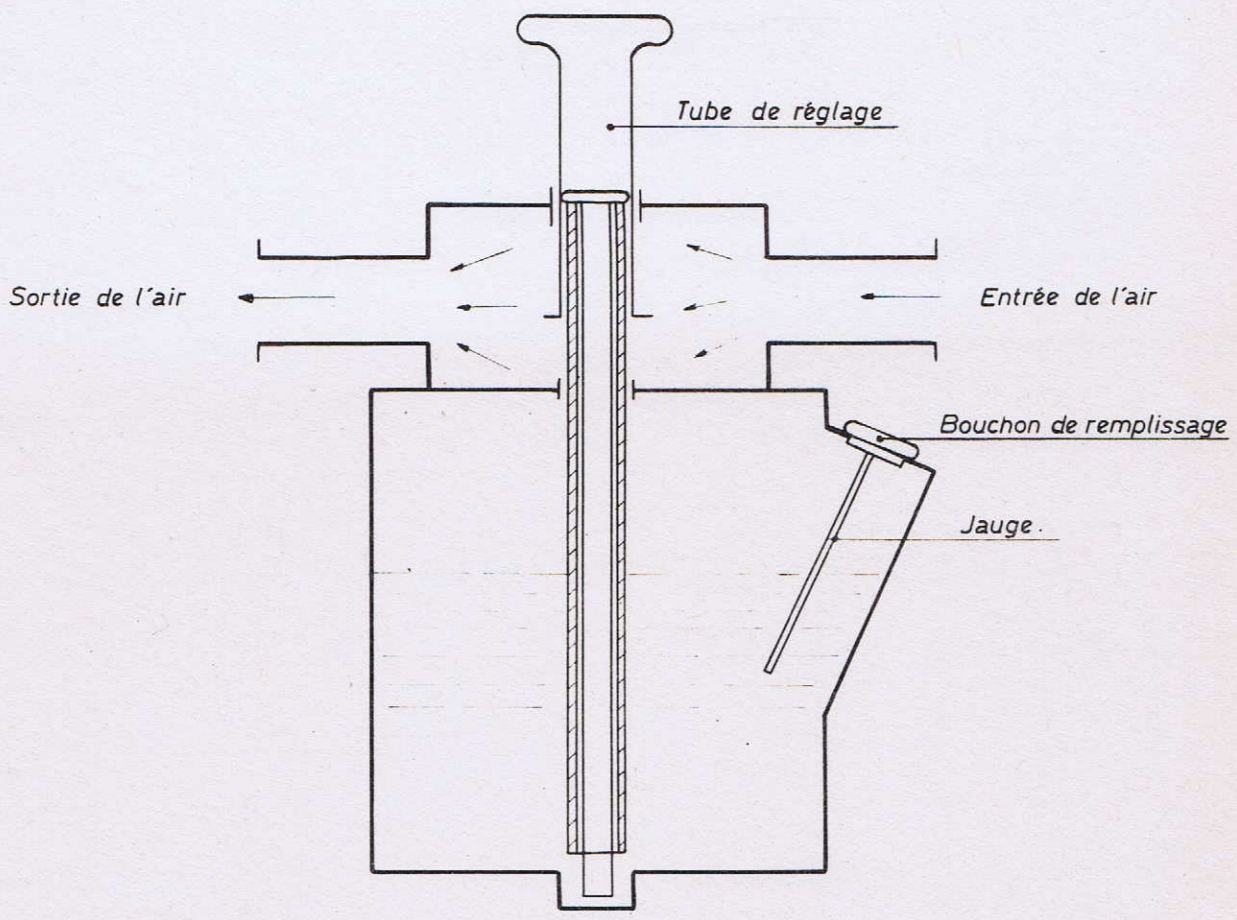
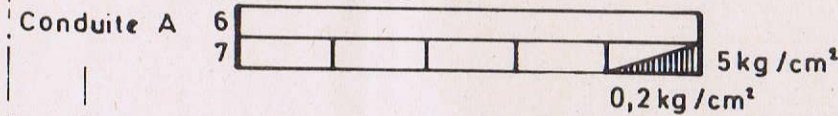


Fig. 94.2.1.

Position du volant
Position sur 138F
Conduite B

00	O	S	I	II
A	I	II	III	IV
1				
2				
3	Fermé			
4	Fermé			

Soupape de fin réglage



Commande de la motorisation

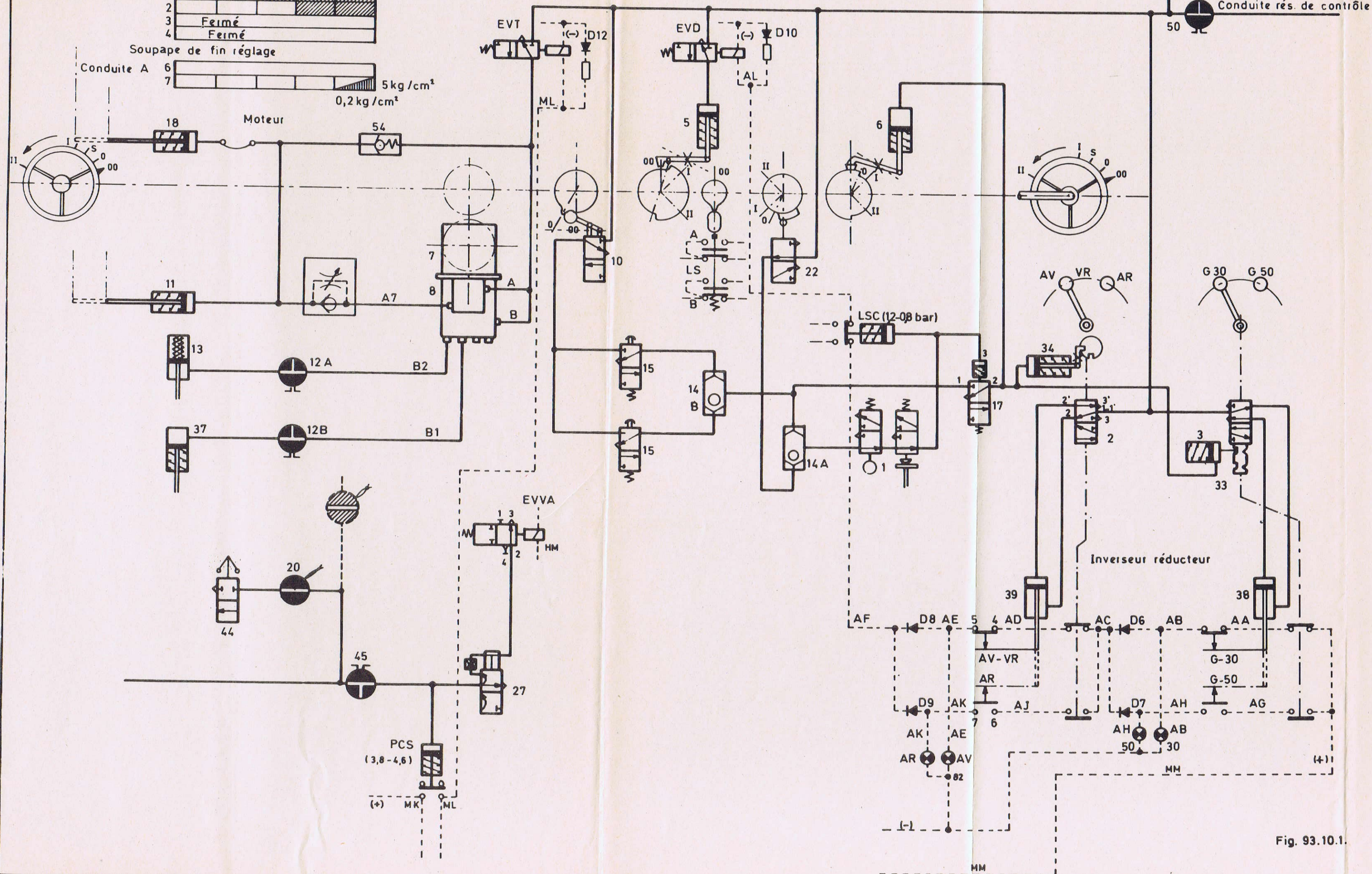


Fig. 93.10.1.

LEGENDE

- | | |
|---|---|
| 1 Palpeur | 45 Robinet d'isolement VA |
| 2 Inverseur de marche | 50 Robinet d'isolement du reservoir de contrôle |
| 3 Changeur de gammes | 53 Valve d'étranglement |
| 5 Verrouillage volant | 54 Valve d'arrêt |
| 6 verrouillage volant | |
| 7 Valve d'admission | |
| 8 Mano détendeur | |
| 10 Relais commande verrouillage | |
| 11 Commande influence primaire | |
| 12 Robinet d'isolement | |
| 13 Soupape de remplissage Voith. | |
| 14 Double valve d'arrêt | |
| 15 Poussoir déverrouillage | |
| 17 Valve relais pneumatique | |
| 18 Servo d'accélération MD | |
| 20 Robinet d'isolement survitesse Voith. | |
| 22 Isolement V.A. | |
| 27 Valve d'urgence | |
| 33 Verrouillage changeur de gammes | |
| 34 Verrouillage inversion | |
| 36 Soupape de sécurité remplissage transmission | |
| 37 Servo remplissage partiel | |
| 38 Changement de gammes | |
| 39 Changement de marche | |
| 44 Soupape de survitesse Voith. | |

Dispositif de veille automatique

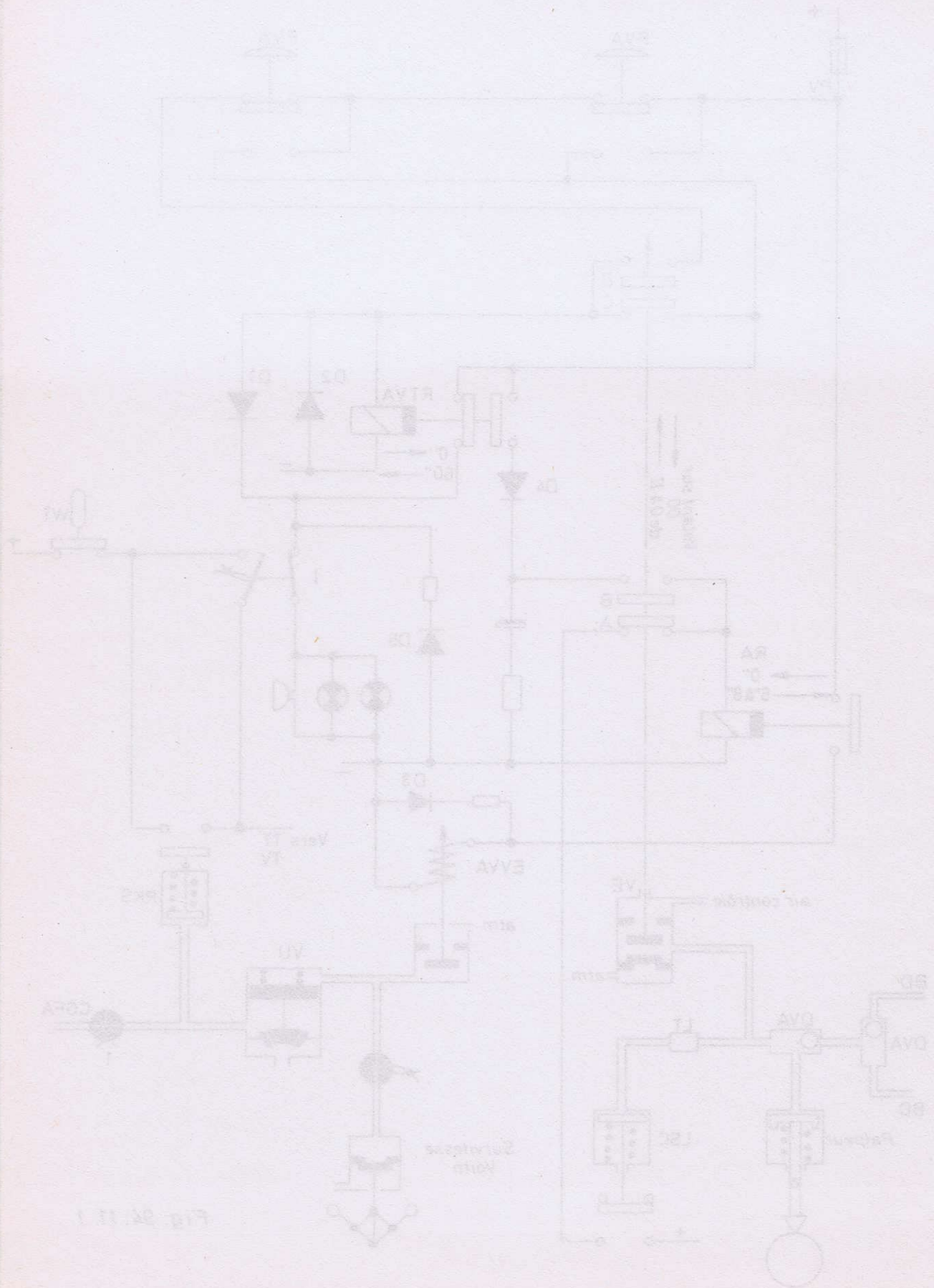


Fig. 24.11.1

Dispositif de veille automatique

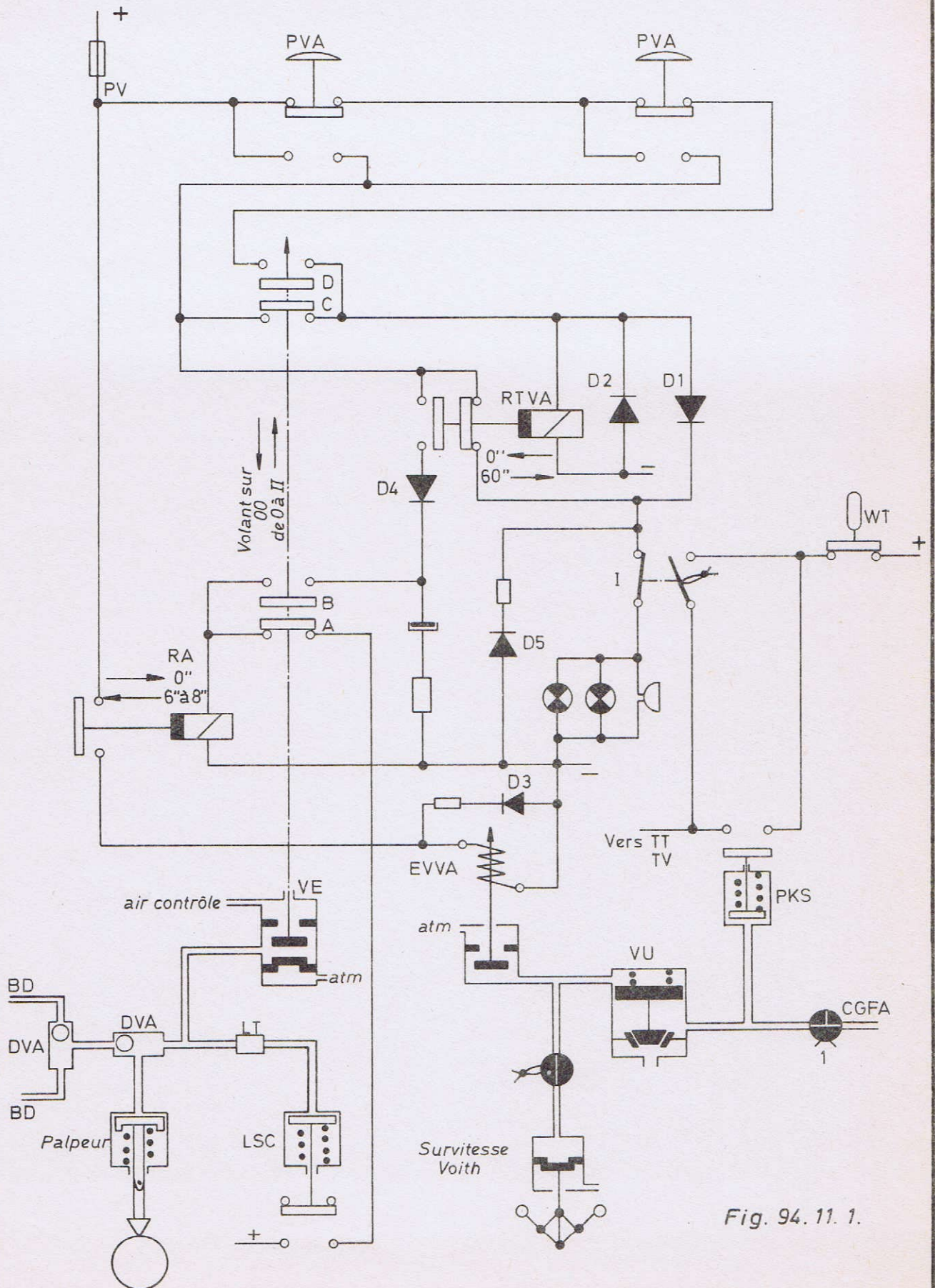


Fig. 94.11.1.

PVA.	Pedale veille automatique
PV	
RTVA	relais temporise veille automatique 0"-60"
RA	relais 6" x 8"
EVVA	Electro Valve Veille automatique
LSC	mano contact
DVA	
VE	soufflage
VU	
PKS	
CGFA	
WT	

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