

海軍機關學校

機關學教科書補助機械附圖

生徒第三學年

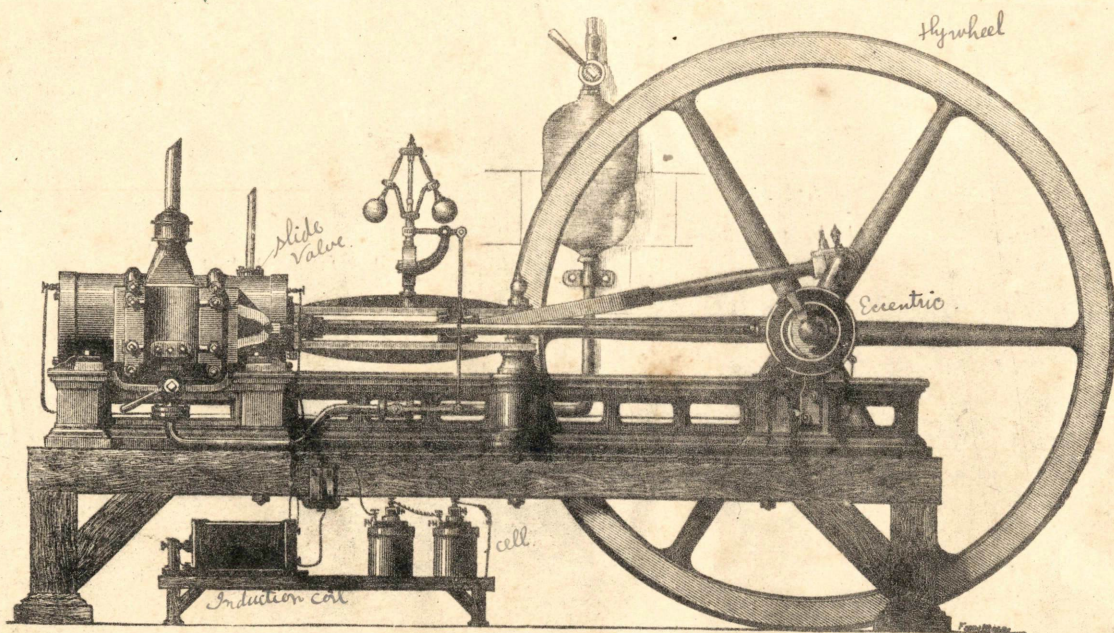
大正五年三月十日



7



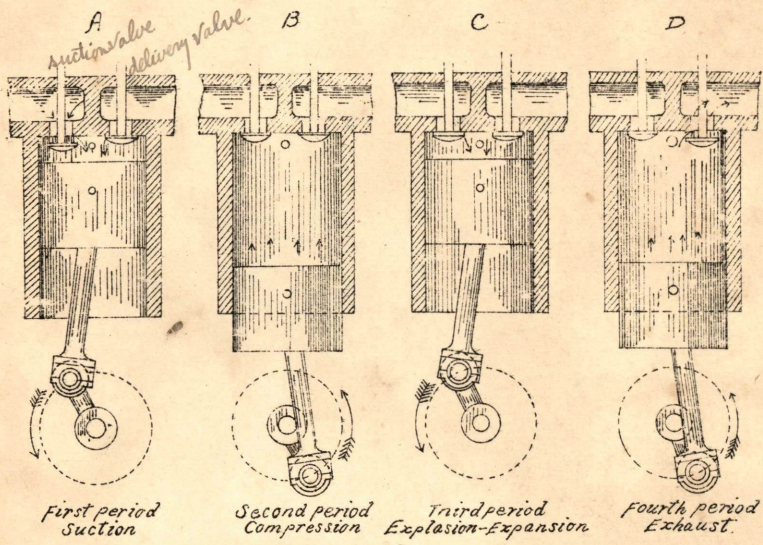
第一圖



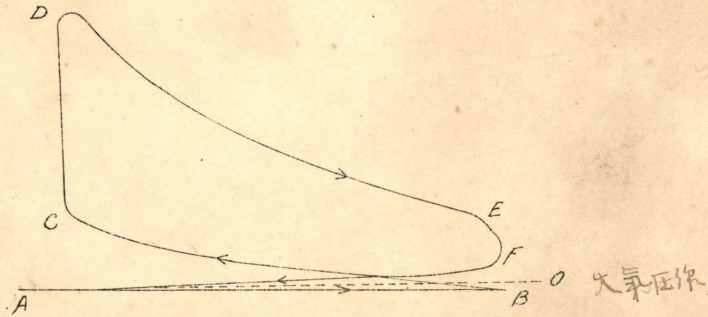
Lenoir's Gas Engine 3 HP. Double acting.



第二图

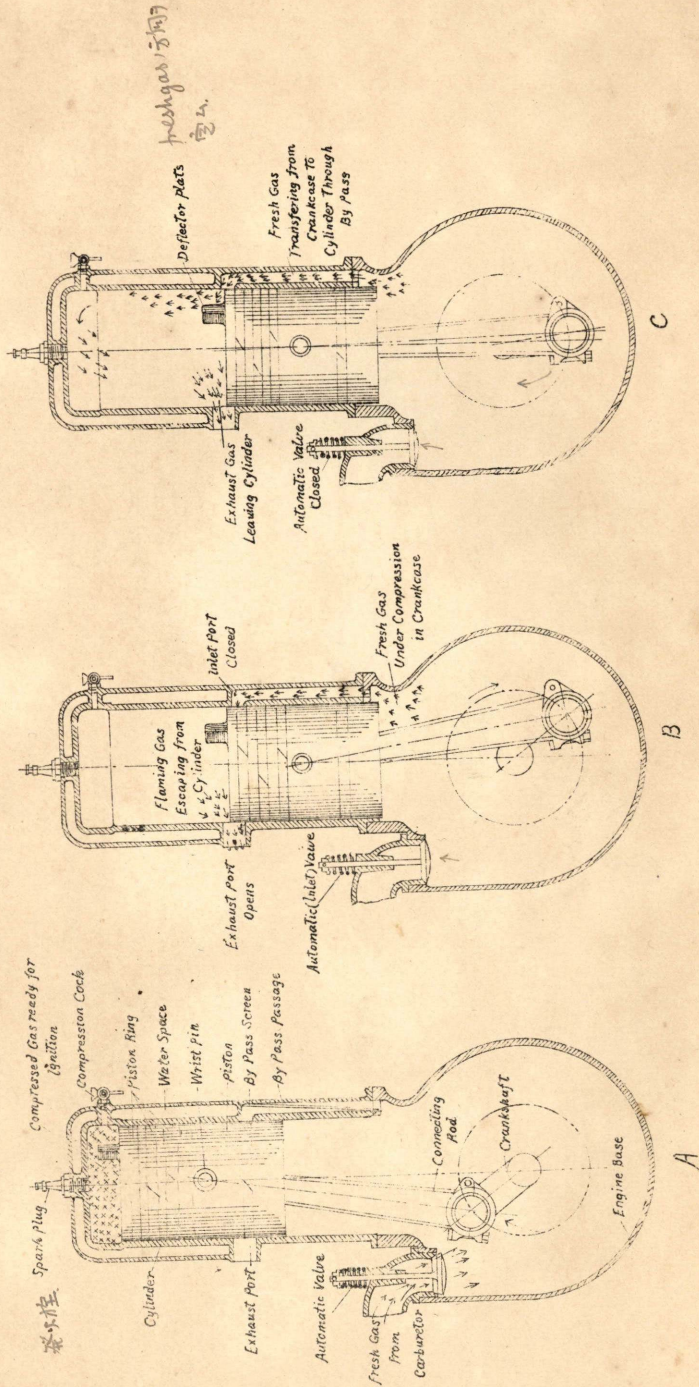


第三图

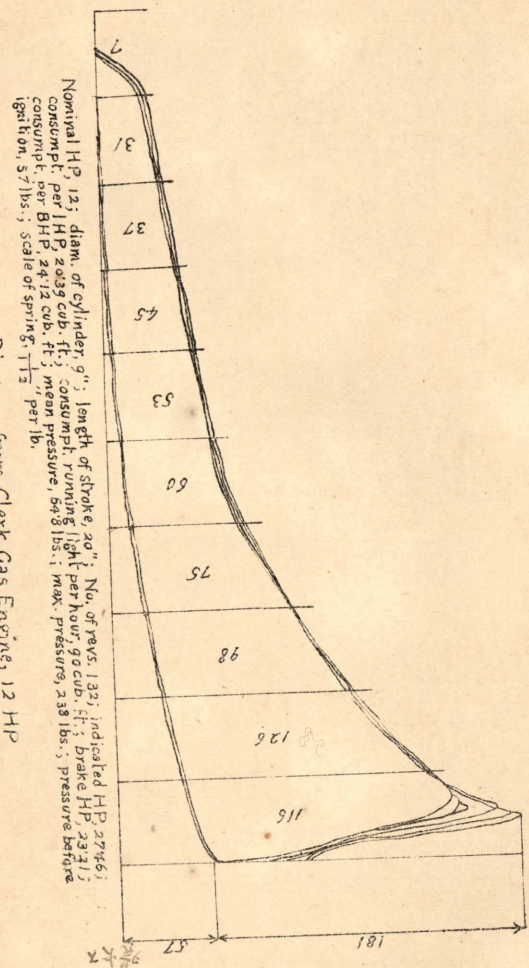


第四图

Defining Two-port, Two-Cycle Engine Action.

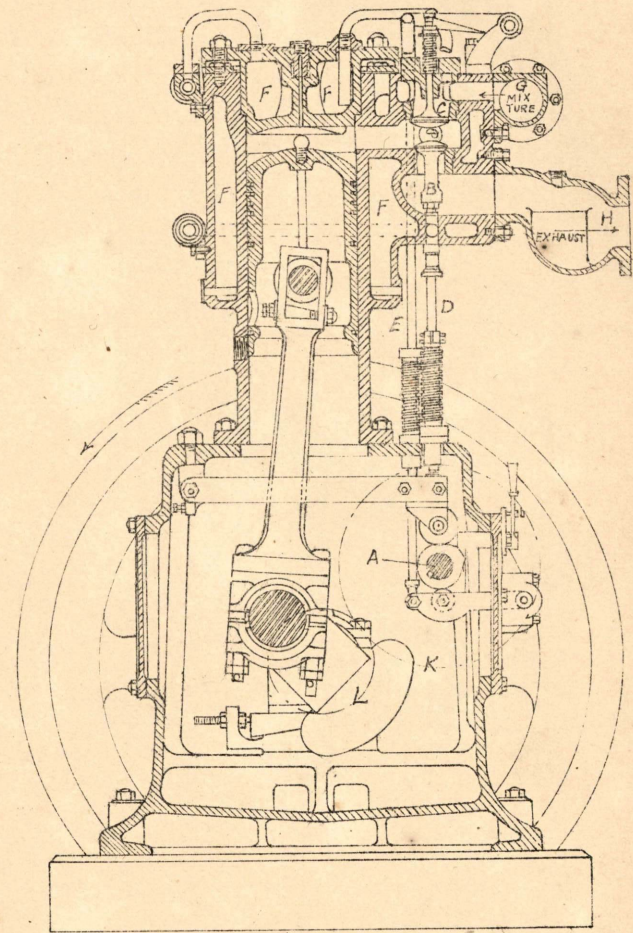






第五图

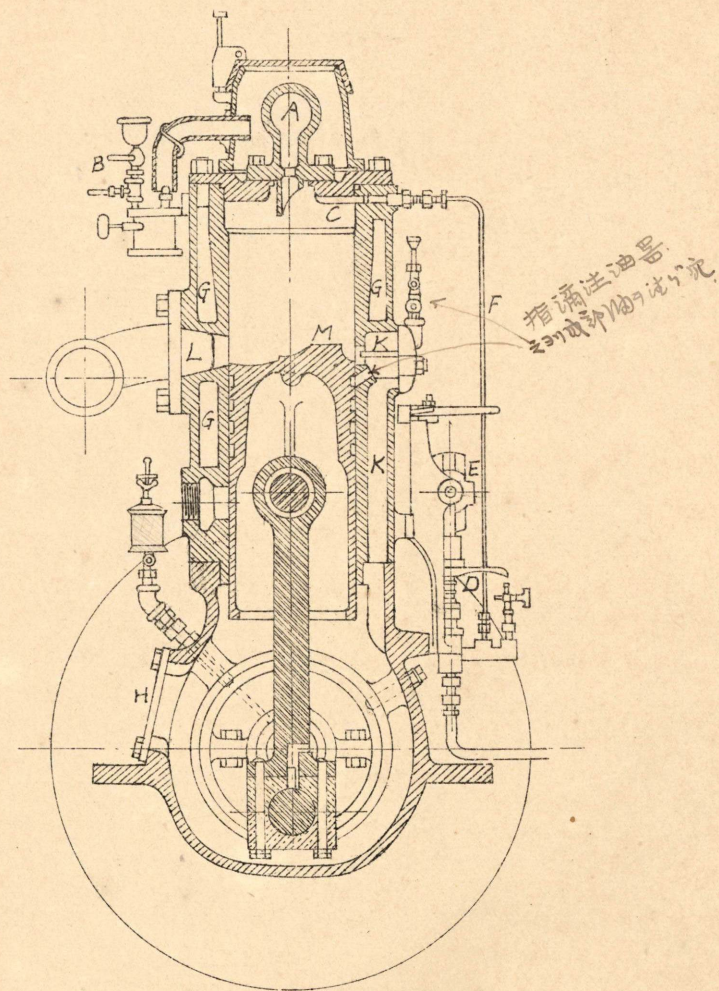
第六图



Westinghouse standard vertical gas-engine.

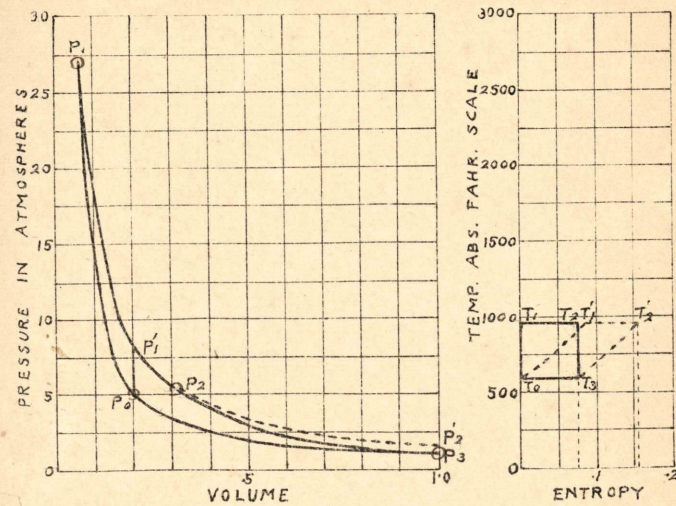


第七图

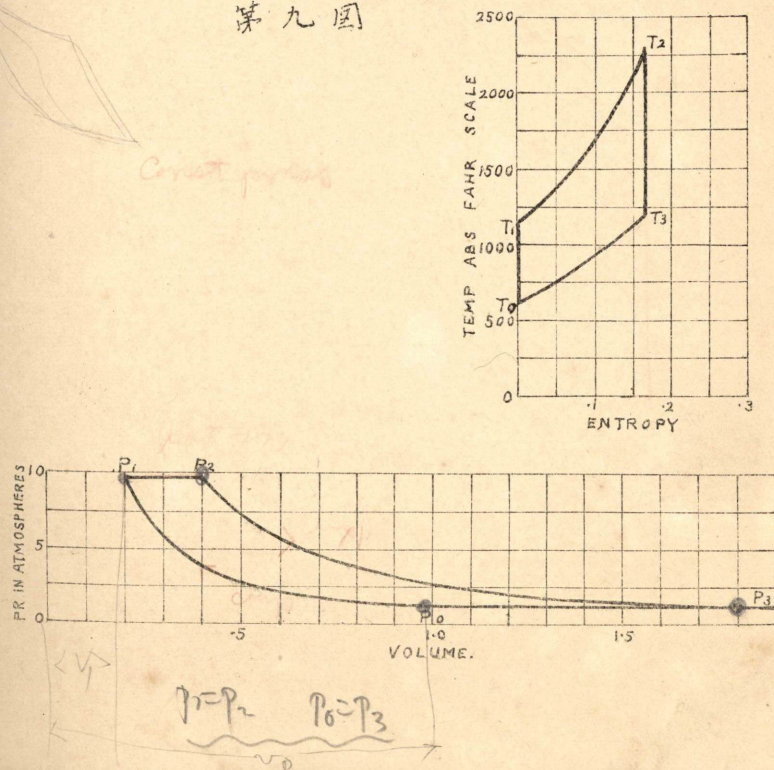


Mietz and Weiss marine oil-engine.

第八图

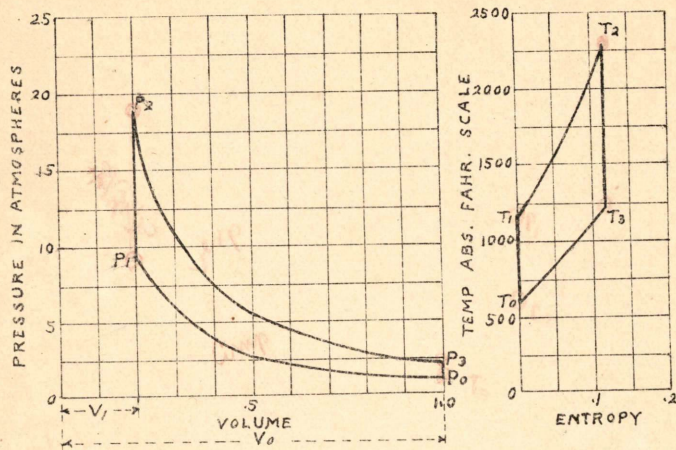


第九图

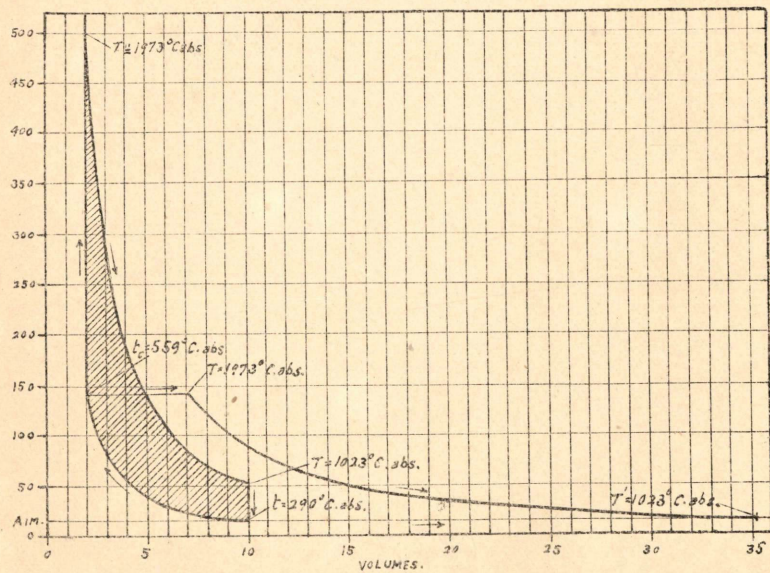




第十图



第十一图

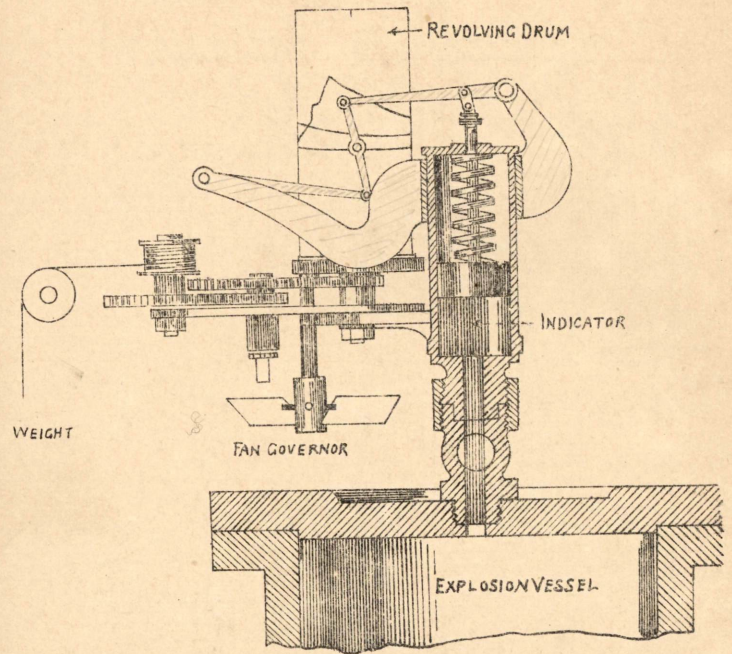


|                              | Constant pressure.          | Constant volume             |
|------------------------------|-----------------------------|-----------------------------|
| Compression pressure         | 141.8 lbs. per sq. in. abs. | 141.8 lbs. per sq. in. abs. |
| Maximum pressure             | 141.8 lbs. per sq. in. abs. | 500 lbs. per sq. in. abs.   |
| Mean pressure                | 37 lbs. per sq. in.         | 105 lbs. per sq. in.        |
| Pressure at end of expansion | 14.7 lbs. per sq. in. abs.  | 51.8 lbs. per sq. in. abs.  |
| Efficiency                   | 0.42                        | 0.48                        |

Diagrams of Air Engines

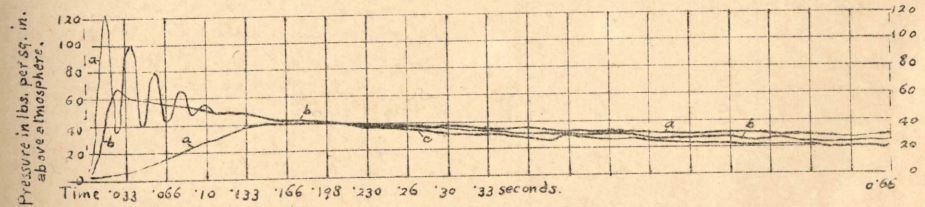
air standard efficiency

第十二图



Clerk Explosion Apparatus of years 1884 and 1885

第十三图, 一



Vessel used 7 ins. diam. and  $8\frac{1}{2}$  ins. long. Scale of indicator spring, 1 lb. =  $\frac{1}{2}$  in.  
 Mixtures used: pure hydrogen and air - Experiment a, 1 vol. hydrogen to 6 vols. air; b, 1 to 4; c, 1 to 5.  
 Temperature of gases before ignition, 16° C.; pressure (atmospheric), 14.7 lbs.

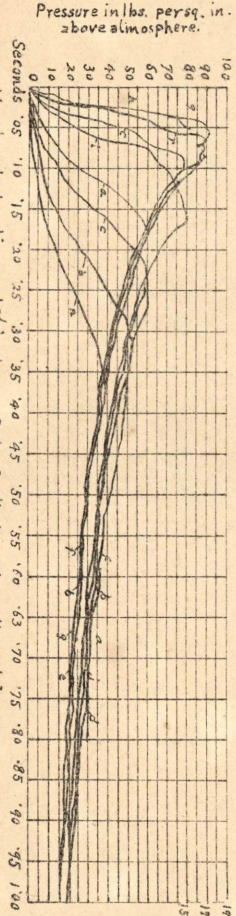
Explosion of Gaseous Mixtures. Experiments in a closed vessel.



Explosion of Gaseous Mixtures. Experiments in a closed vessel.

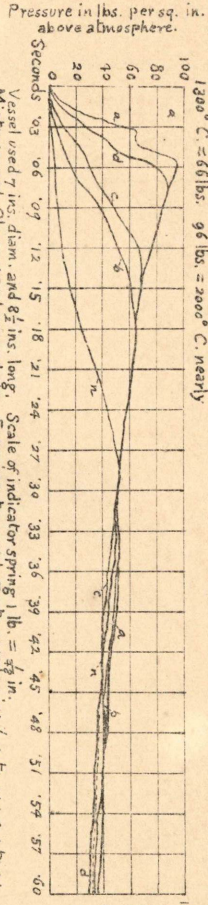
Vessel used 7 ins. diam. and 8 1/2 ins. long. Scale of indicator spring, 1 lb. = 3 1/2 in.  
 Mixtures used, Oldham coal gas and air. Experiment a, 1 Vol. Gas to 14 Vols. air; temp. (of explosion and measuring vessel) 18° C.; b, 1 to 13, 16, 20; c, 1 to 12, 100; d, 1 to 11, 167; e, 1 to 9, 187; f, 1 to 7, 167; g, 1 to 6, 180; h, 1 to 5, 160; i, 1 to 4, 190.

Centigrade temperatures, assuming no loss of volume, owing to combination of mixtures. Atmospheric pressure, 14.7 lbs., and mean temperature before ignition, 17° C.



Degrees  
 199°  
 189°  
 179°  
 169°  
 152°

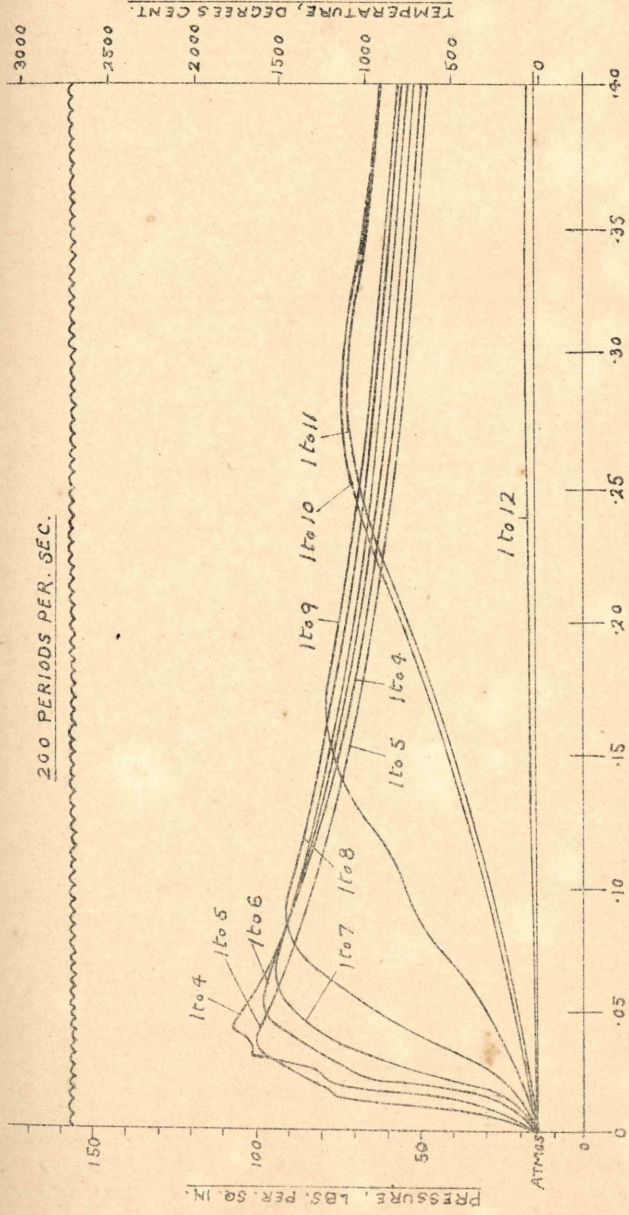
第十三圖 三



203°  
 174°  
 145°  
 60  
 87°  
 58°  
 29°  
 18°

第十四圖 二

第十四圖



TIME, SECS.

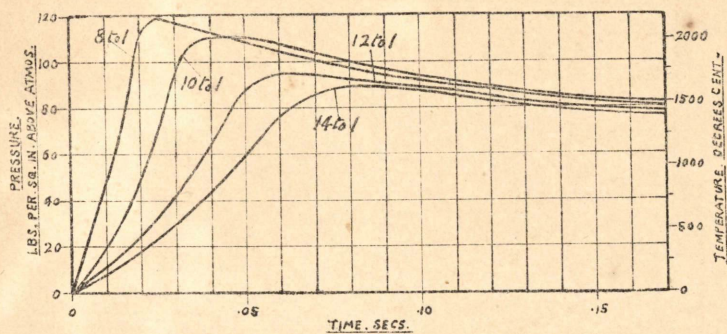
Analysis of Coal Gas

|                          |       |
|--------------------------|-------|
| Hydrogen                 | 45.2  |
| Marsh gas                | 27.9  |
| Unsaturated hydrocarbons | 8.1   |
| Carbonic oxide           | 10.3  |
| Oxygen                   | 10.8  |
| Nitrogen                 | 10.0  |
|                          | 100.1 |

Explosion in a Closed Vessel. London Gas, 1900.



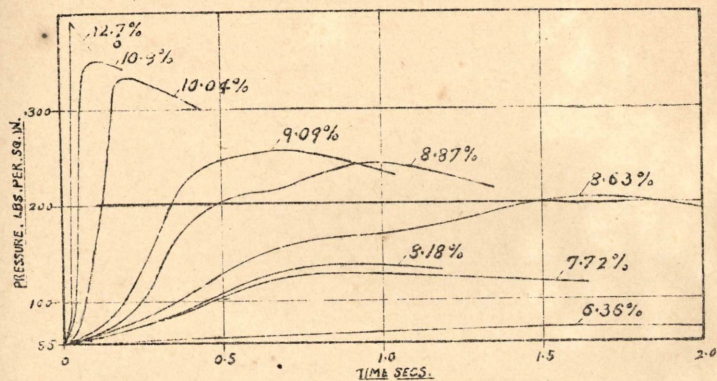
第十五图, 一



Diagrams of Explosion

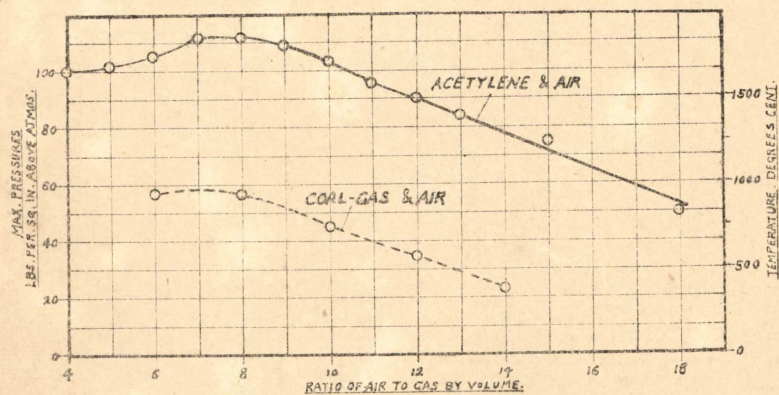
Various mixtures of acetylene and air ignited at atmospheric pressure.

第十六图, 一



Explosion and part Cooling Curves of various mixtures of gas and air at initial pressure of 55 lbs. per sq. in. absolute.

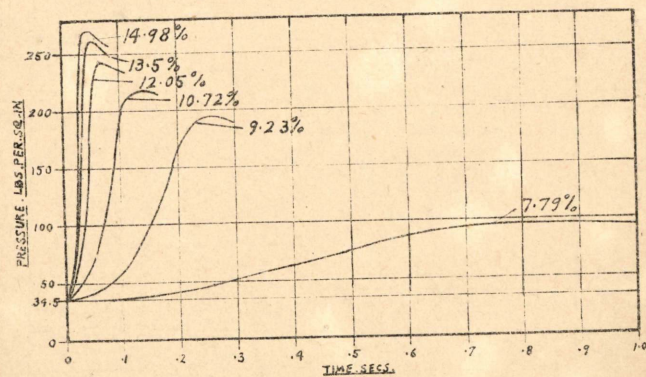
第十五图, 二



Explosion in a Closed Vessel

Maximum pressures recorded when exploding mixtures of acetylene and air, also coal gas and air. Initial pressure, 1 atmosphere; initial temperature, 0° C.

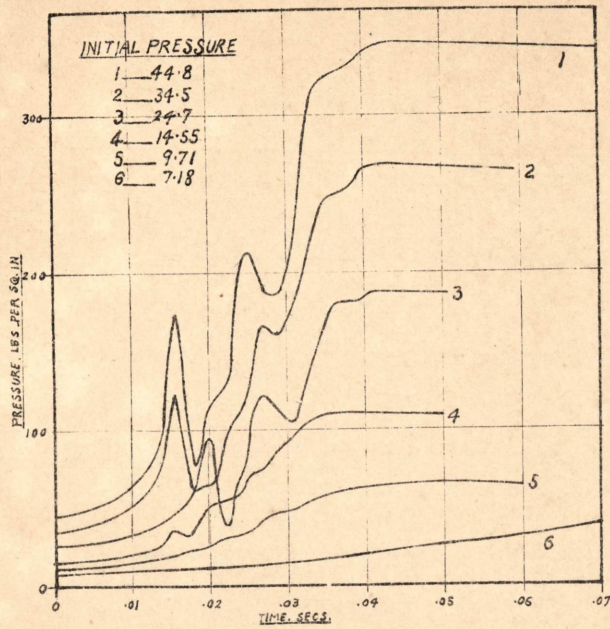
第十六图, 二



Explosion and part Cooling Curves of various mixtures of gas and air at initial pressure of 34.5 lbs. per sq. in. absolute. (Baird and Alexander)

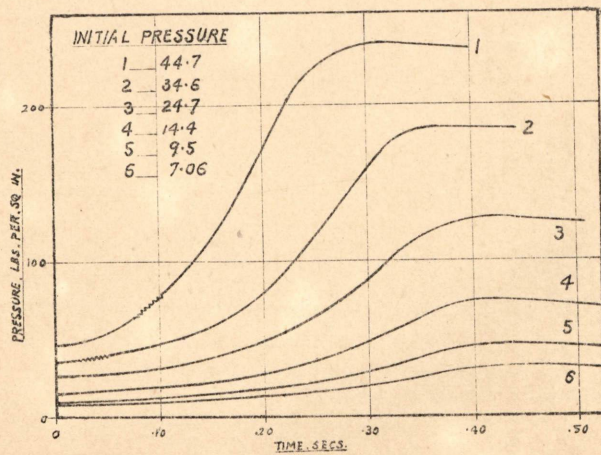


第十六图, 三



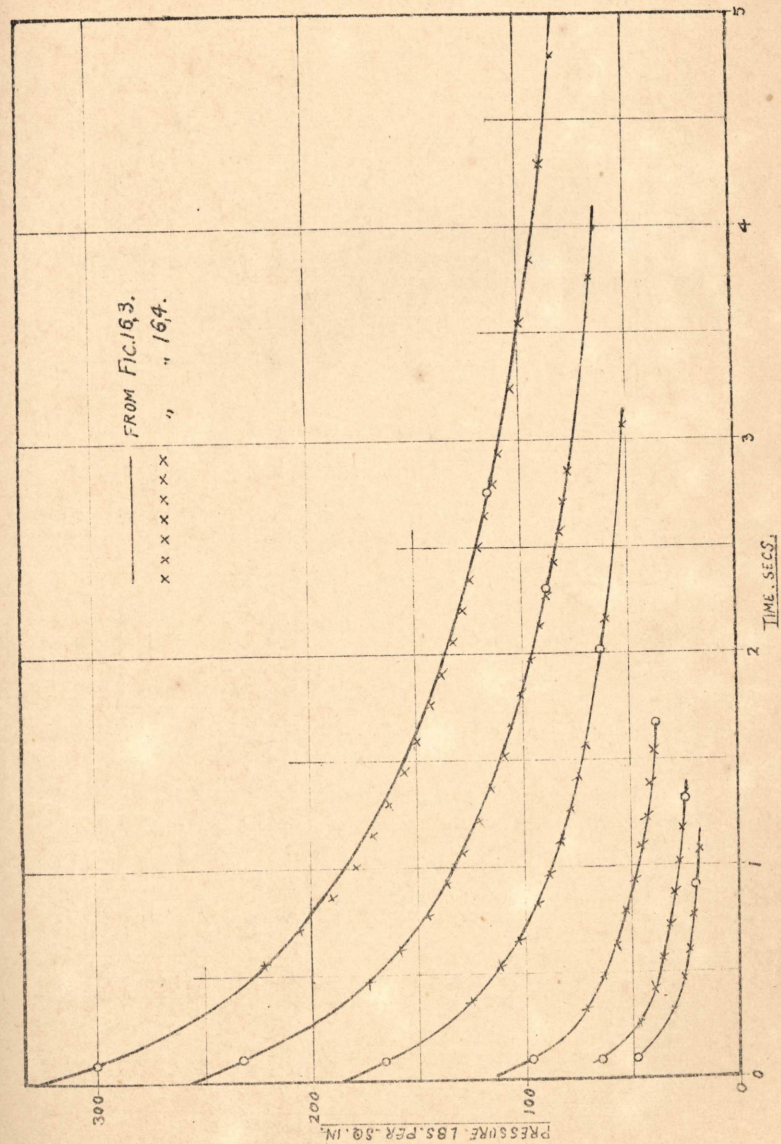
Explosion Curves of gas and air mixture containing 14.4 per cent. of coal gas at varying initial pressures between 7 and 45 lbs. per sq. in. absolute. (Baird and Alexander)

第十六图, 四



Explosion Curves of gas and air mixture containing 9.5 per cent. of coal gas at varying initial pressures between 7 and 45 lbs. per sq. in. absolute. (Baird and Alexander)

第十七图

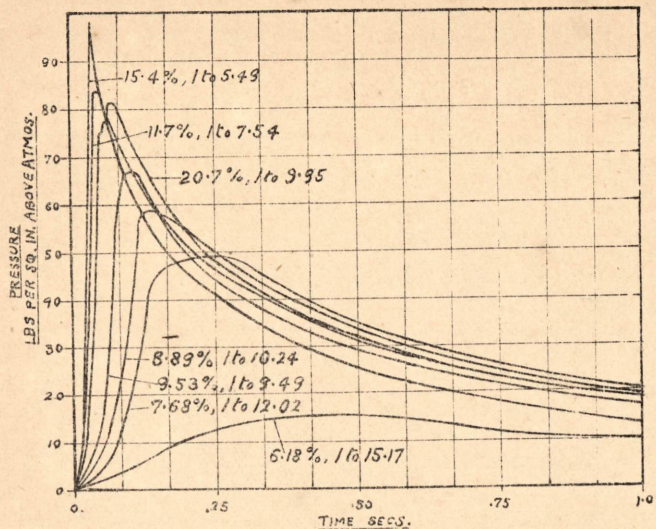


Cooling Curves for Explosion Experiments shown at figs 163 and 164. (Baird and Alexander)



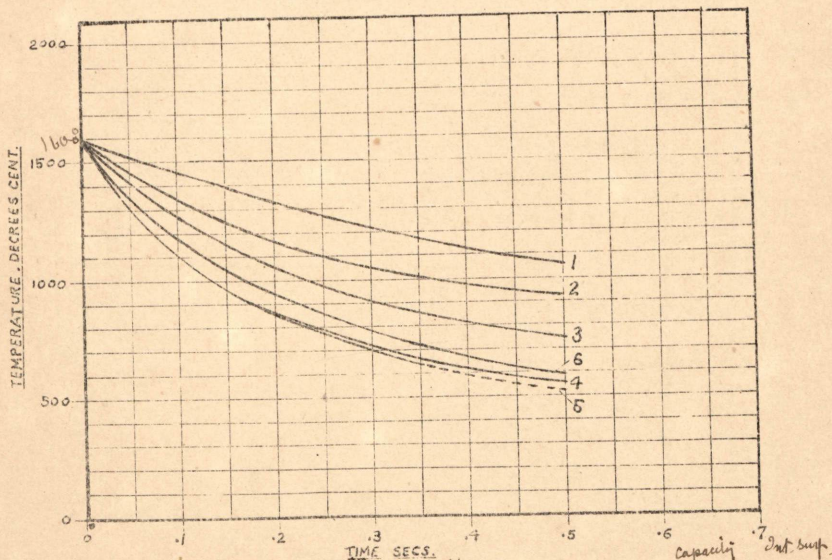
34170-9X537

9x14  
第十八图



Explosion of Gaseous Mixtures in a Closed Vessel.  
Boston Experiments.

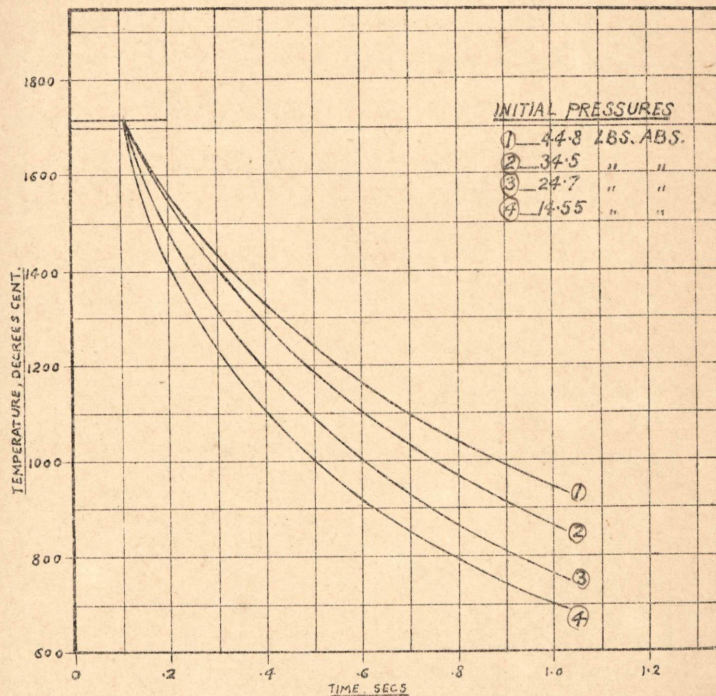
第十九图



- | No. | Vessel                     | Capacity    | Surface Area | Volume      | Surface Area |
|-----|----------------------------|-------------|--------------|-------------|--------------|
| 1.  | Hopkinson's Large Vessel   | 6.2 cub ft  | 17.3 sq ft   | 0.183 cu ft | 1.79 sq ft   |
| 2.  | Bairdrow and Alexander     | 0.82 "      | 5.02 "       | 0.180 "     | 1.79 "       |
| 3.  | Hopkinson's Small Vessel   | 0.664 "     | 4.39 "       | 0.150 "     | 1.60 "       |
| 4.  | Clerk's Vessel, 1884, 1885 | 0.183 cu ft | 1.79 sq ft   | 0.183 cu ft | 1.79 sq ft   |
| 5.  | Boston Experiments         | 0.180 "     | 1.79 "       | 0.180 "     | 1.79 "       |
| 6.  | Clerk's Vessel, 1900       | 0.150 "     | 1.60 "       | 0.150 "     | 1.60 "       |

Cooling after Explosion in Closed Vessels of different dimensions  
from temperature 1600° C. for 0.5 second

30  
20  
10  
0  
第二十图

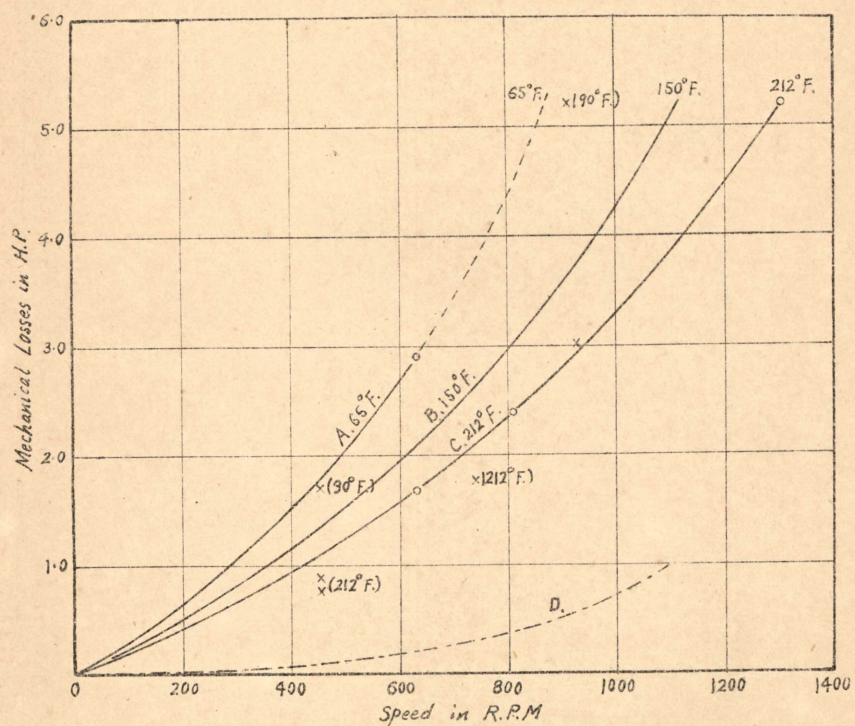


- INITIAL PRESSURES
- ① 44.8 LBS. ABS.
  - ② 34.5 " "
  - ③ 24.7 " "
  - ④ 14.55 " "

Cooling from the same mean temperature in the same explosion vessel  
with different initial pressures. After explosion of mixture containing  
1 Vol. gas to 5.95 vols. air.

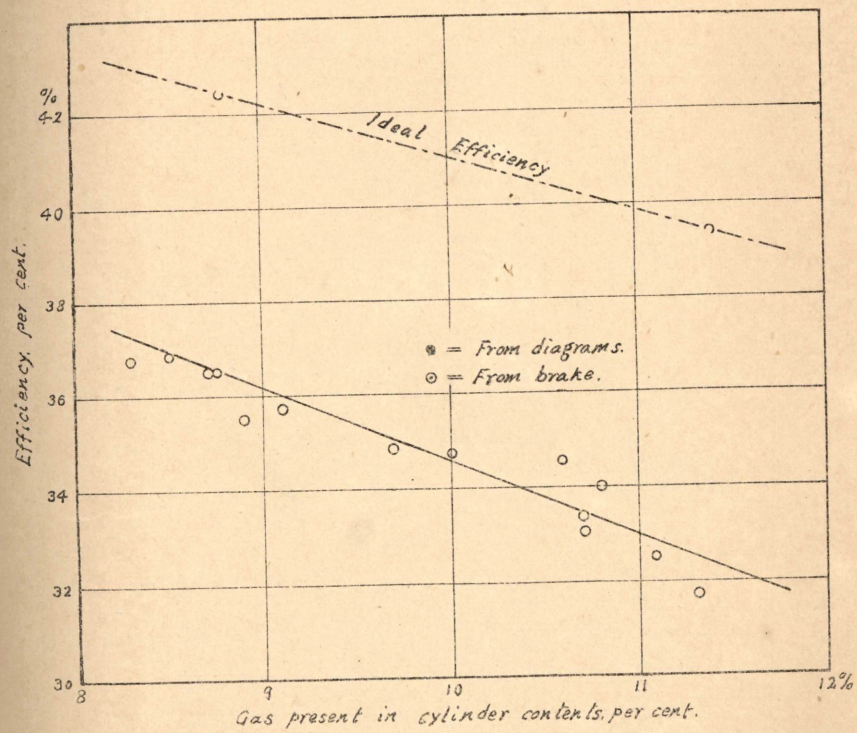


第二十一图



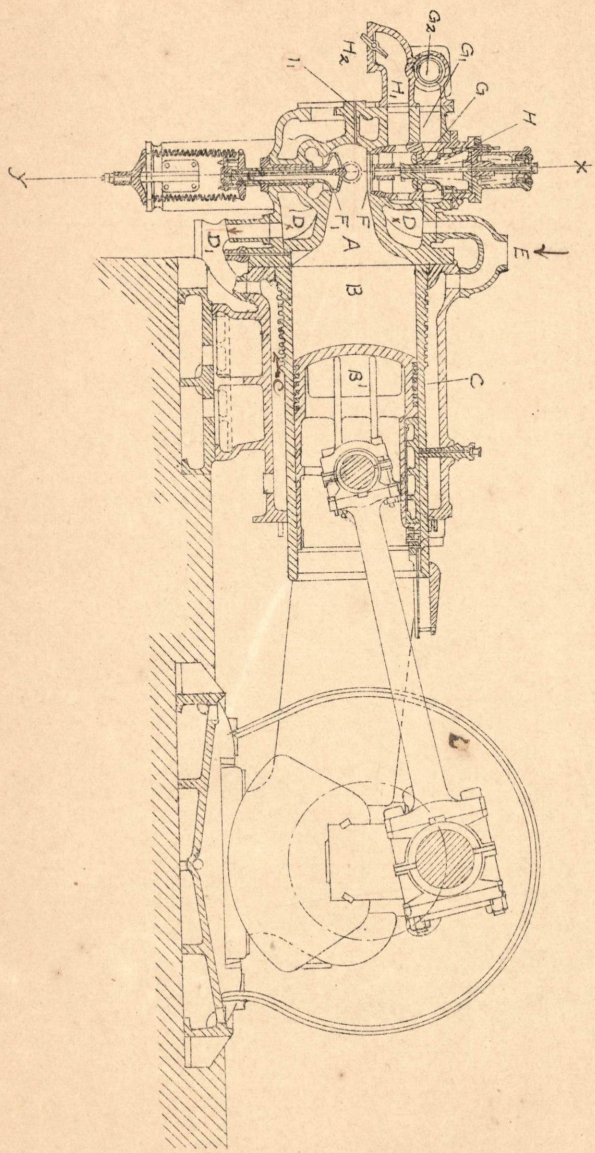
Mechanical loss of Daimler engine with varying temperatures of water jacket. (Hopkinson)

第二十二图



Curves showing indicated thermal efficiency at full load in terms of strength of mixture. (Hopkinson)



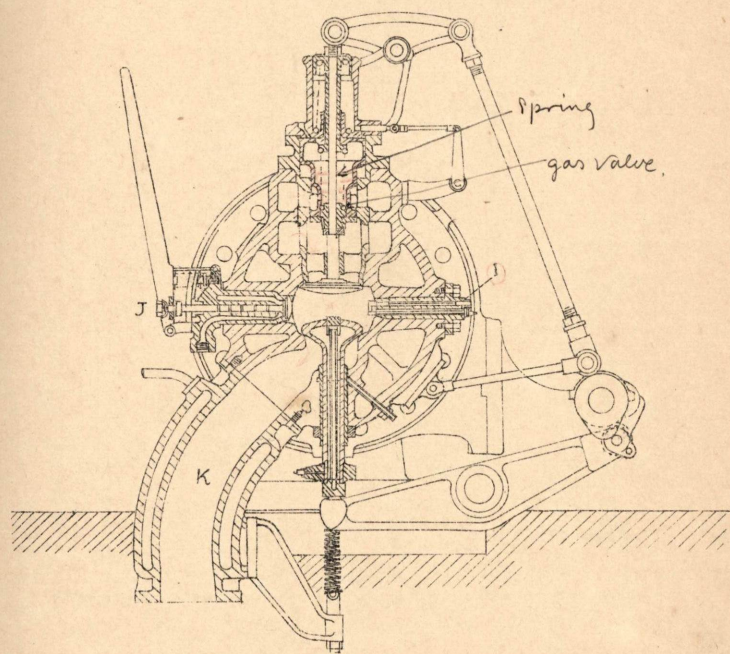


第二十三图

A

第二十三图

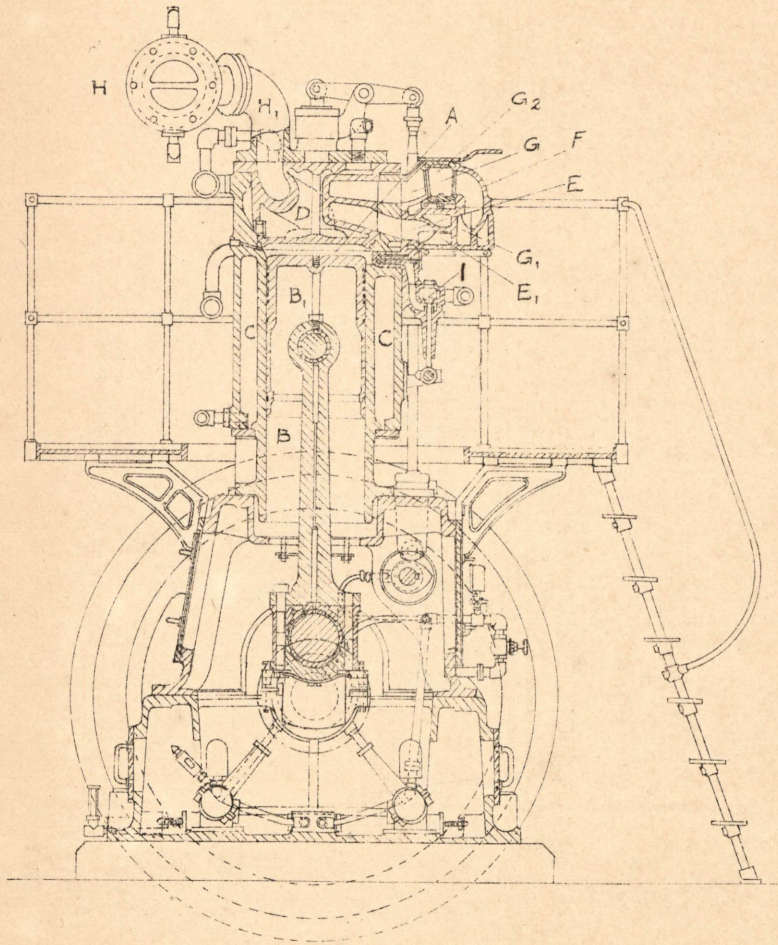
B



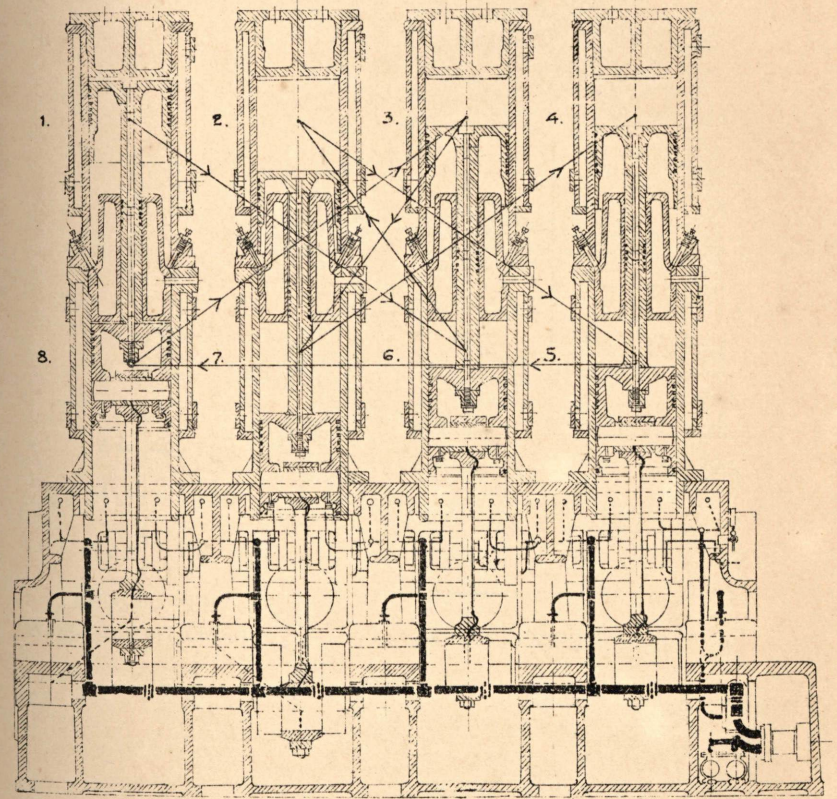


第二十三图

C  
Otto Vertical gas Engine.

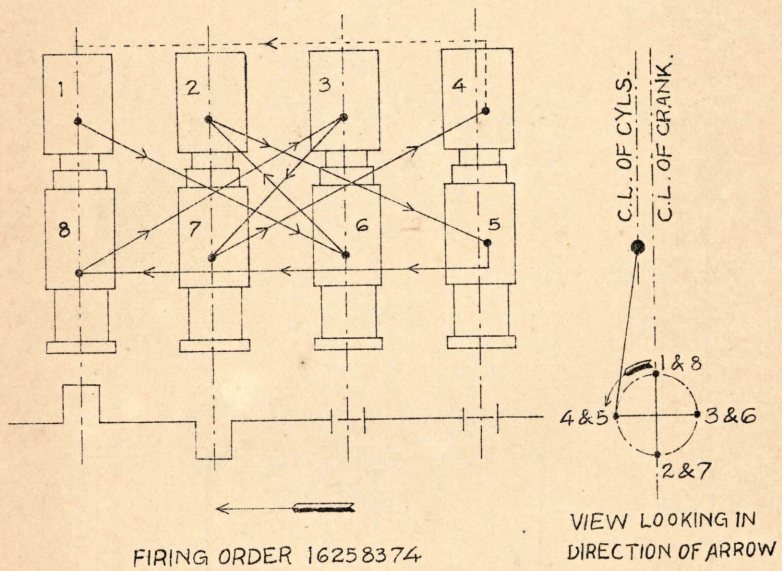


第二十四图



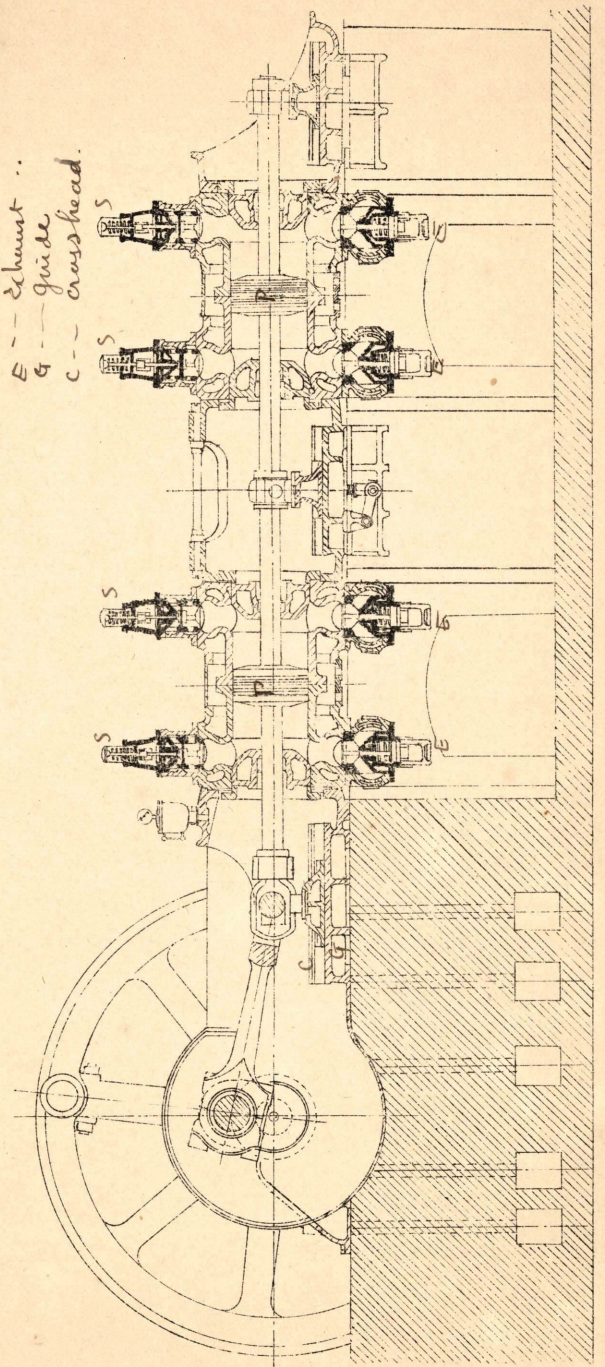


第二十五图



第二十六图

P — piston.  
 S — suction Valve  
 E — exhaust ..  
 G — guide  
 C — crosshead.

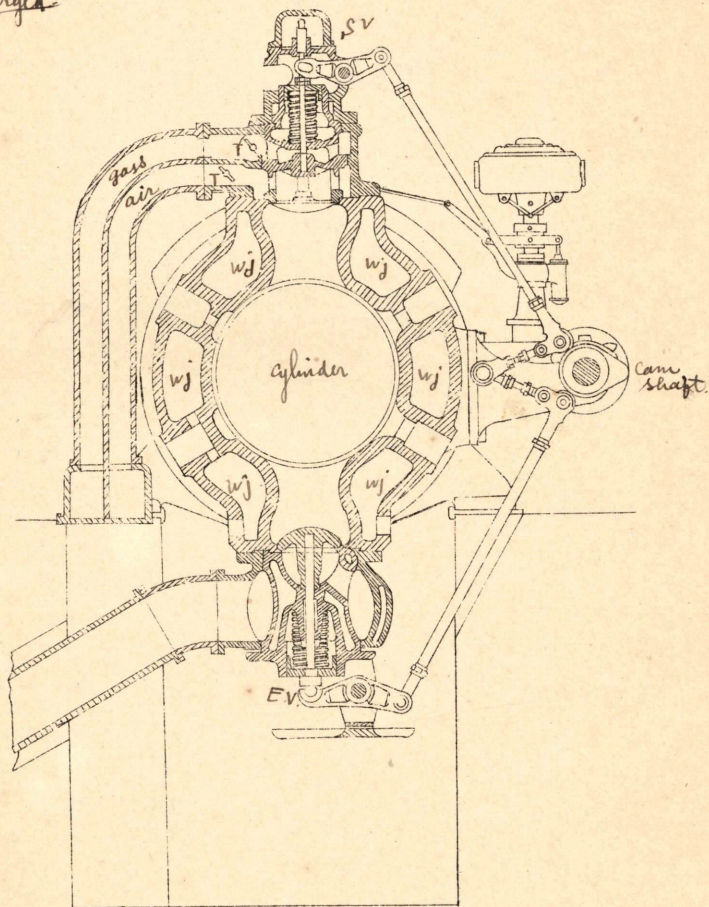




第二十七图

T. -- throttle valve.  
w.j. -- water jacket.

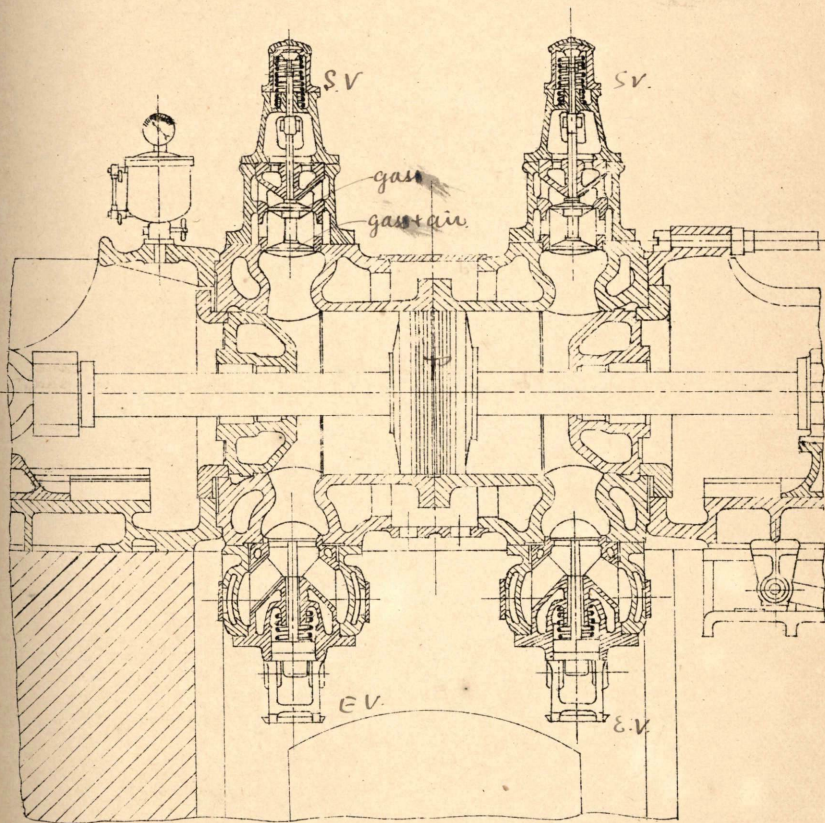
suction valve  
enlarged



Material  
Cast iron

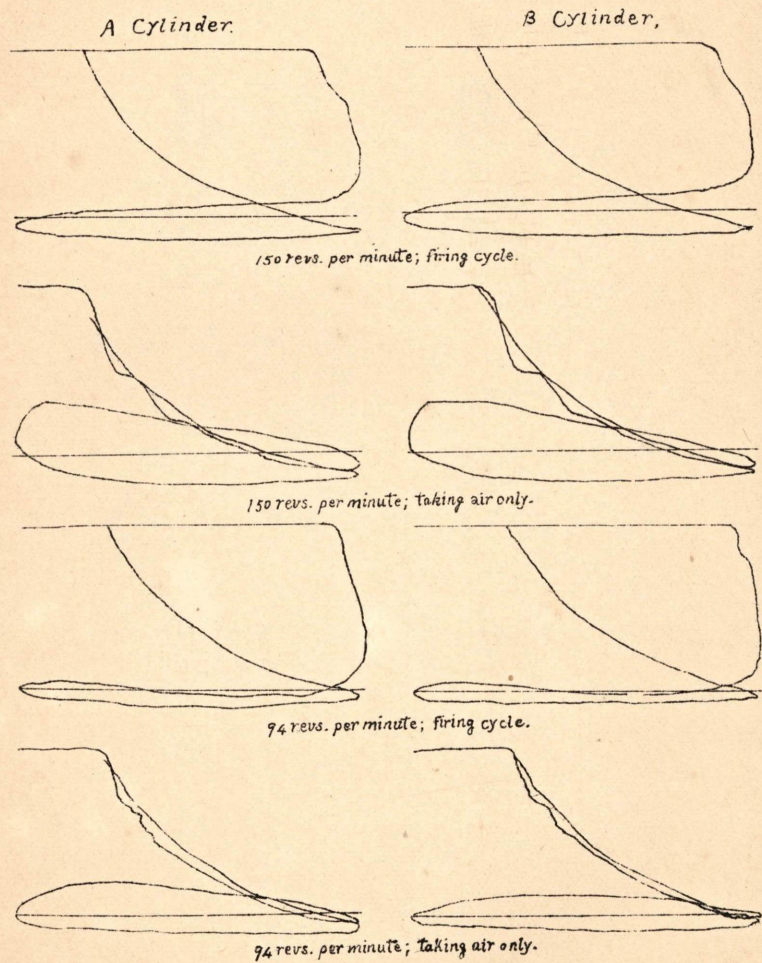
第二十八图

右側 cylinder 擴大圖



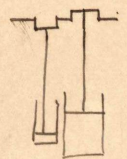
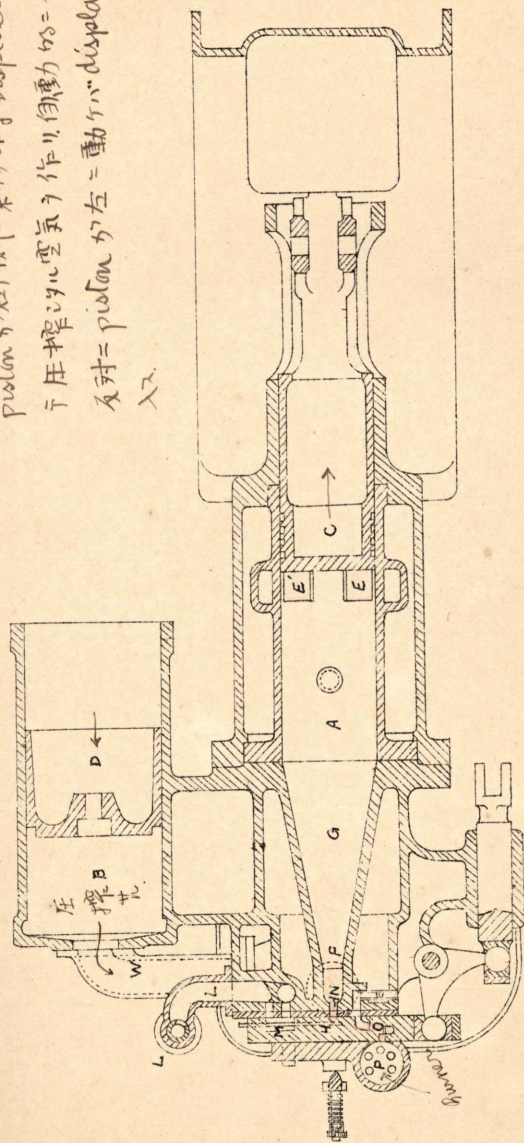


第二十九图



第三十图

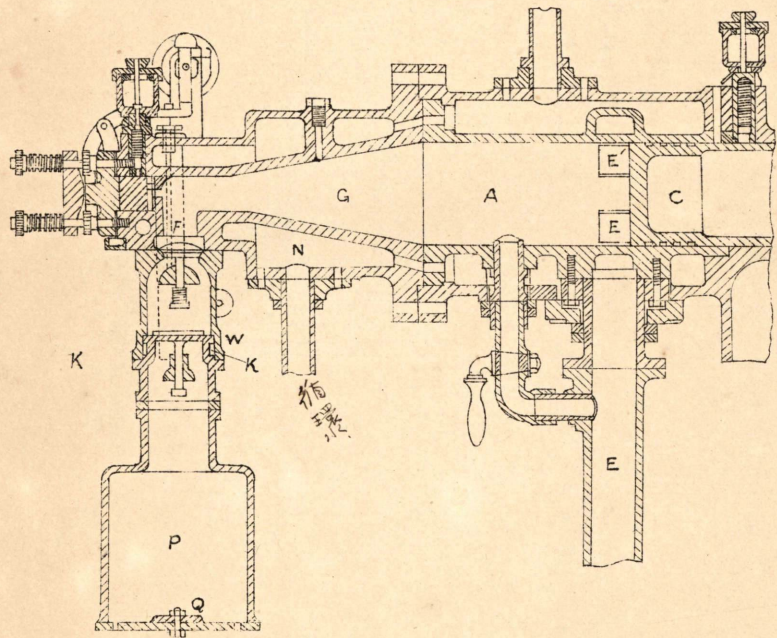
piston 之右側 = 表 1150 轉時 Displacer 之左側 = 動 作  
 之 壓 控 以 之 空 氣 之 作 用 之 自 應 力 之 = 每 一 周 行 空 氣 吸 入  
 及 對 = piston 之 左 = 動 作 之 displacer 之 右 = 物 之 行 吸  
 入



Sectional Plan of Clerk Gas Engine.



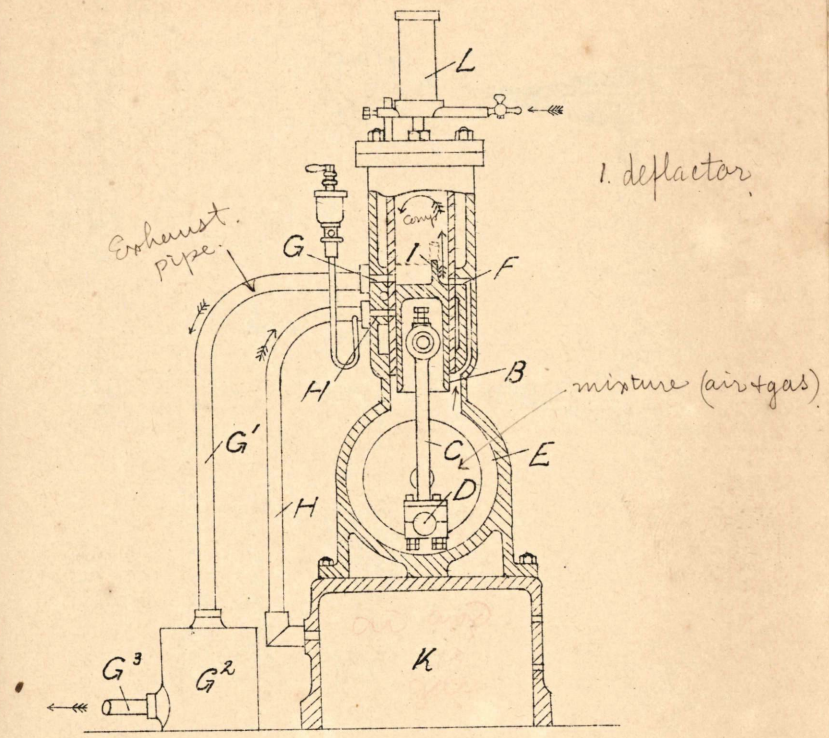
第三十一圖



Longitudinal Section of Clerk Gas Engine.

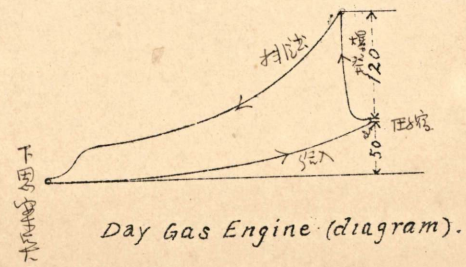
第三十二圖

Day.



Day Gas Engine (vertical section)

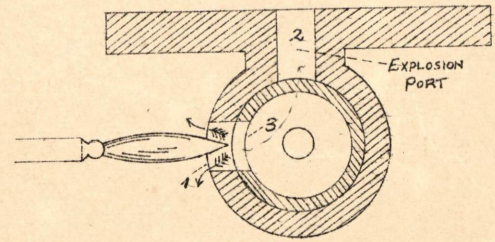
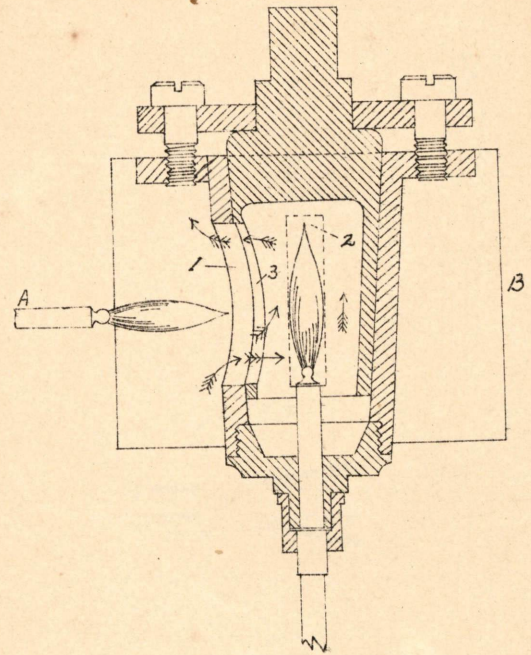
第三十三圖



Day Gas Engine (diagram).

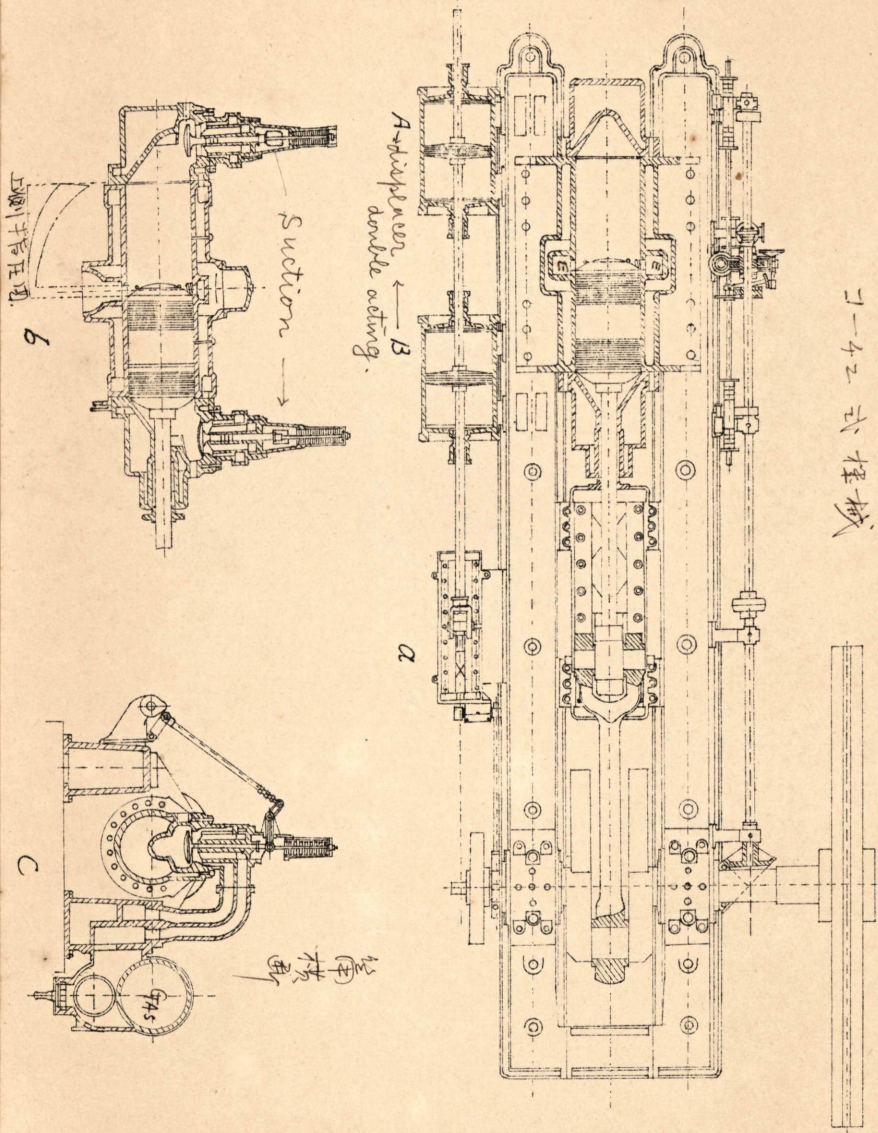


第三十五图



Barnett's Igniting Valve (flame)

第三十四图  
二-4-2 汽机



汽机

GAS

Suction →

A-diplomer ← B  
double acting.

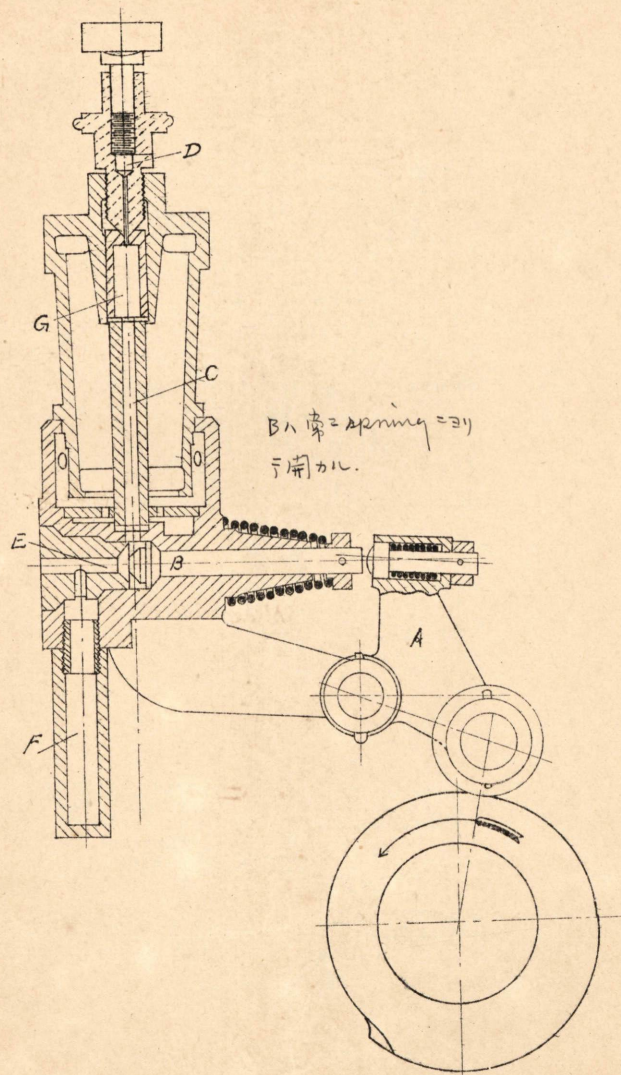
汽机

6

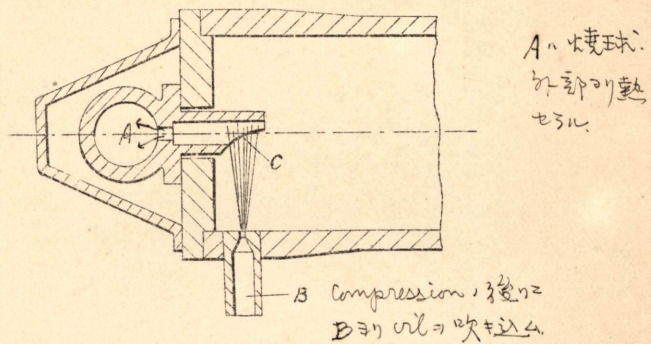
C



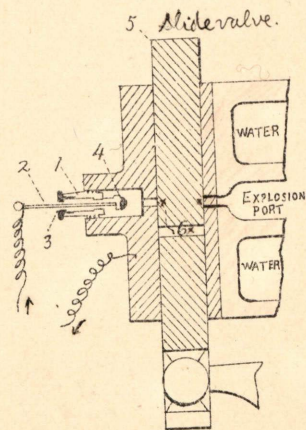
第三十六图



第三十七图



第三十八图 白 磁 磁 磁

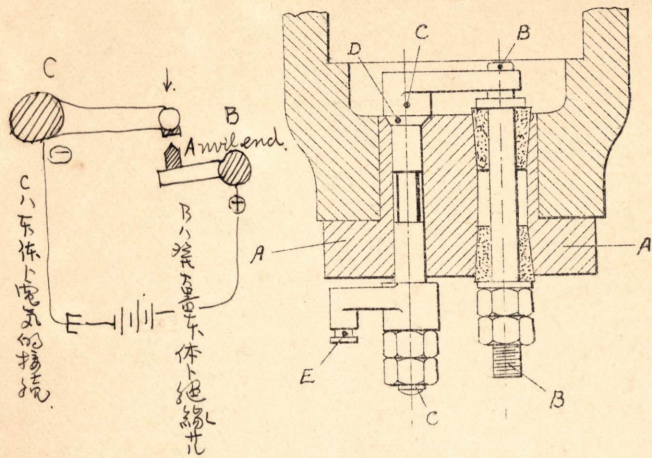


Electrical Igniting Valve (Clerk)

Incandescent platinum wire.



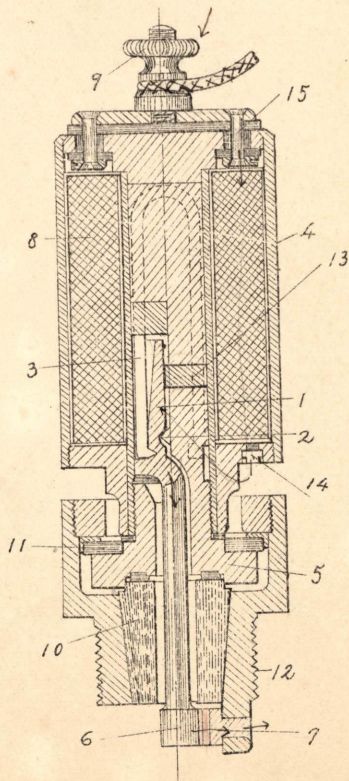
第三十九图  
make and Break 点火装置



此C的功用  
是 Spark  
的接触

第四十图

$1 \frac{5}{16}$  --- Dia.  
4" --- length.



第四十一图

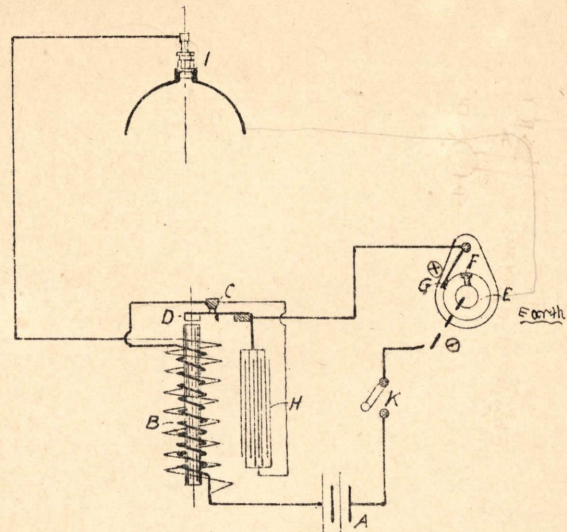
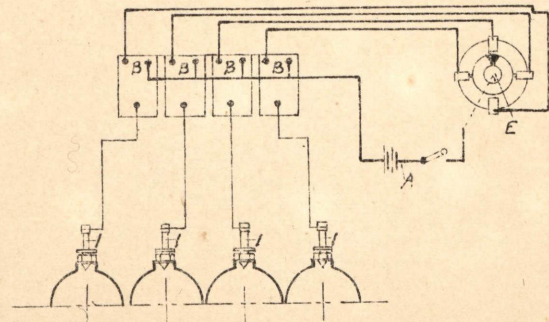


Diagram showing mode of working of high-tension ignition with coil and accumulator. A, Accumulator. B, Induction coil. C, Contact breaker. D, Trembler. E, Commutator on end of cam shaft, for closing circuit at right moment by bringing metal segment F against the brush G. H, Condenser, to make break of current sudden. I, Ignition plug in cylinder. The other end of the secondary winding is earthed.

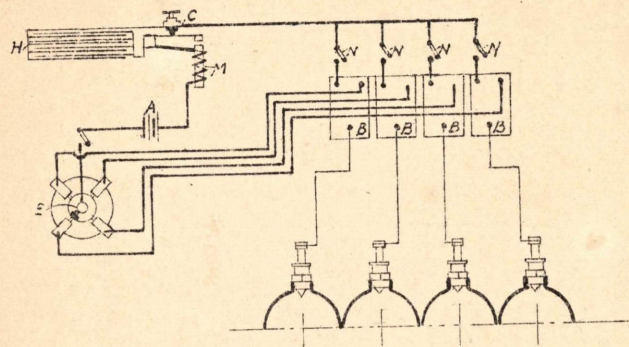
第四十二图



Coil and accumulator ignition, for a four-cylinder engine, with separate coils for each cylinder. A, Accumulator. B, Coils each with its own condenser and contact maker. E, Commutator for distributing current to the various cylinders at the right moment. I, sparking plugs.

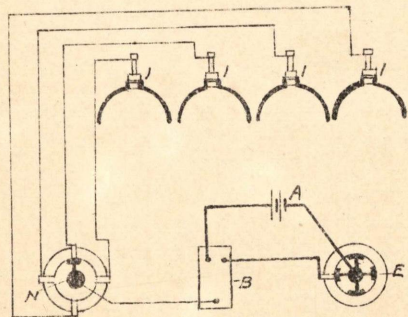


第四十三图



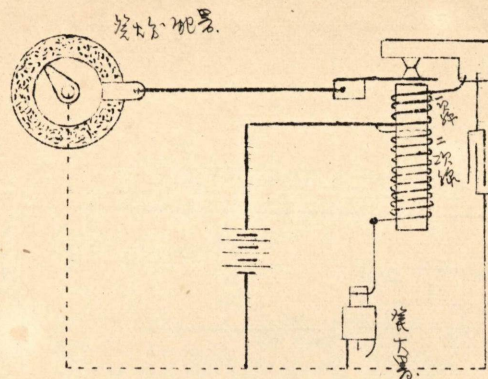
The arrangement shown except that one trembler serves all the coils. This saves having to adjust each trembler until all are working at same frequency. C is the common contact maker, and N are switches for cutting out coils when necessary.

第四十四图



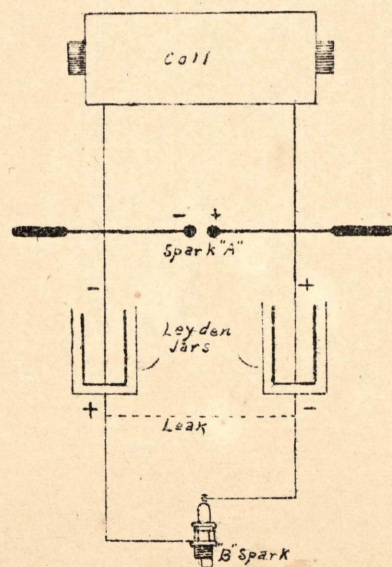
The arrangement of except that the secondary current is distributed directly, so enabling only one coil to be used for all four cylinders. The disadvantage is that the insulation is more difficult to ensure.

第四十五图



High-tension Ignition System with One Condenser in Parallel with Both the Timer and the Trembler Interrupter. One Spark-Plug.

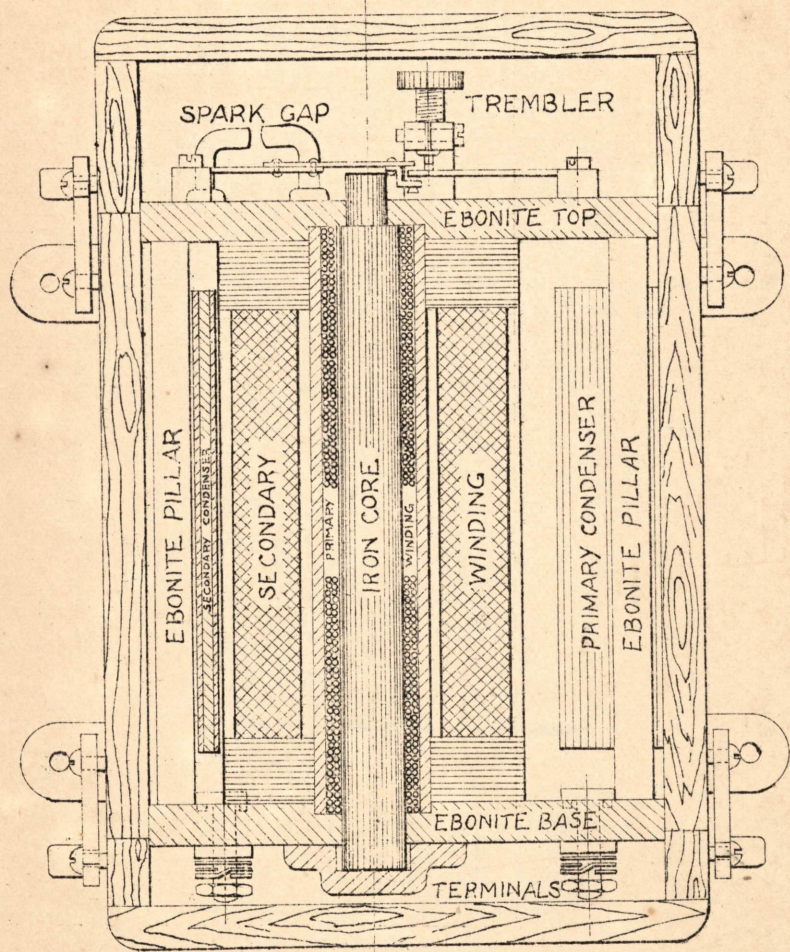
第四十六图



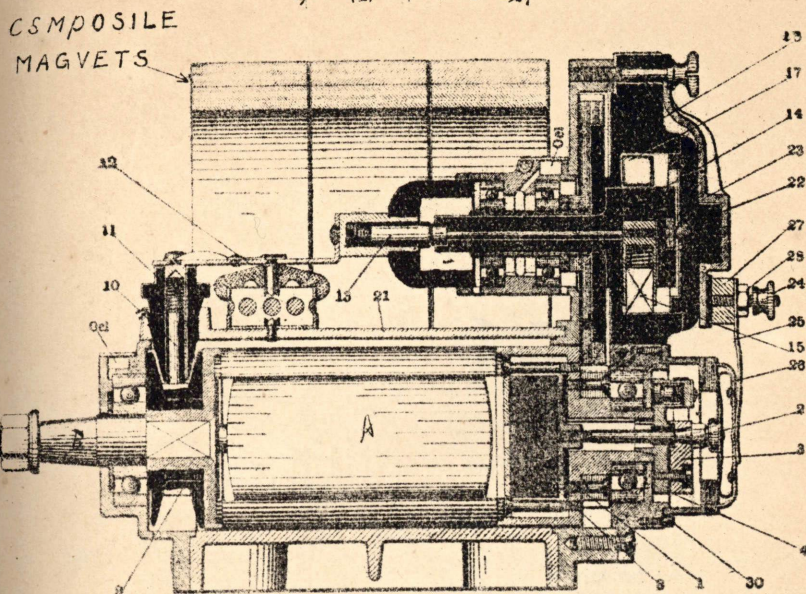
The Lodge Ignition System. Diagram of H.T. circuits.



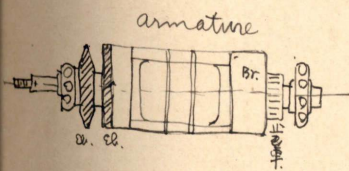
第四十七图



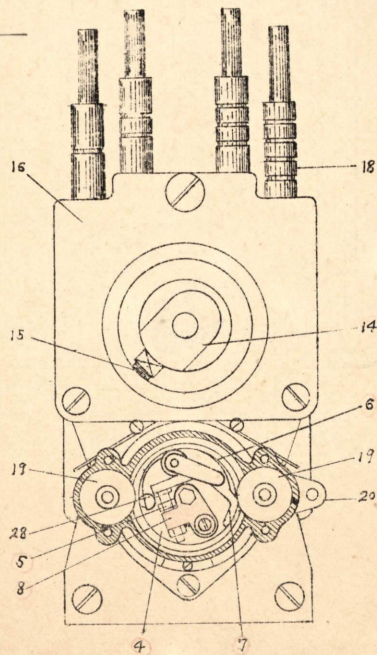
第四十八图



Arrangement of Bosch H.T. Magneto.

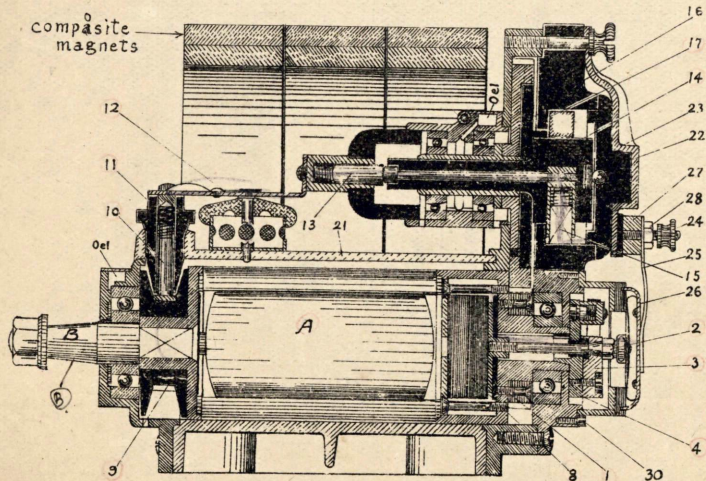


第四十九图



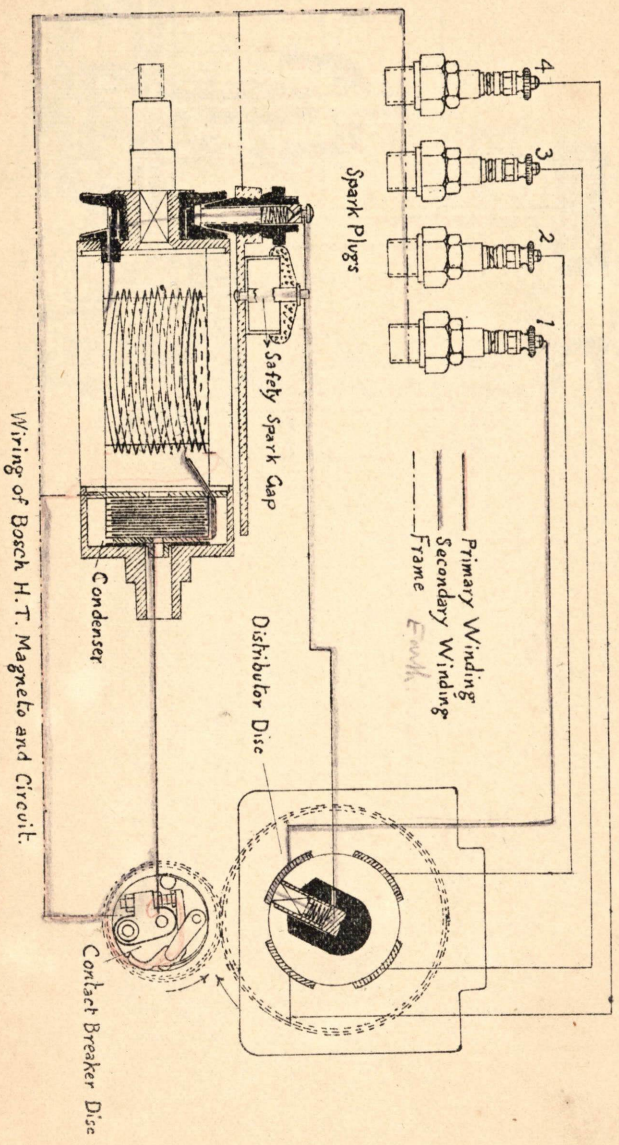


第四十八圖

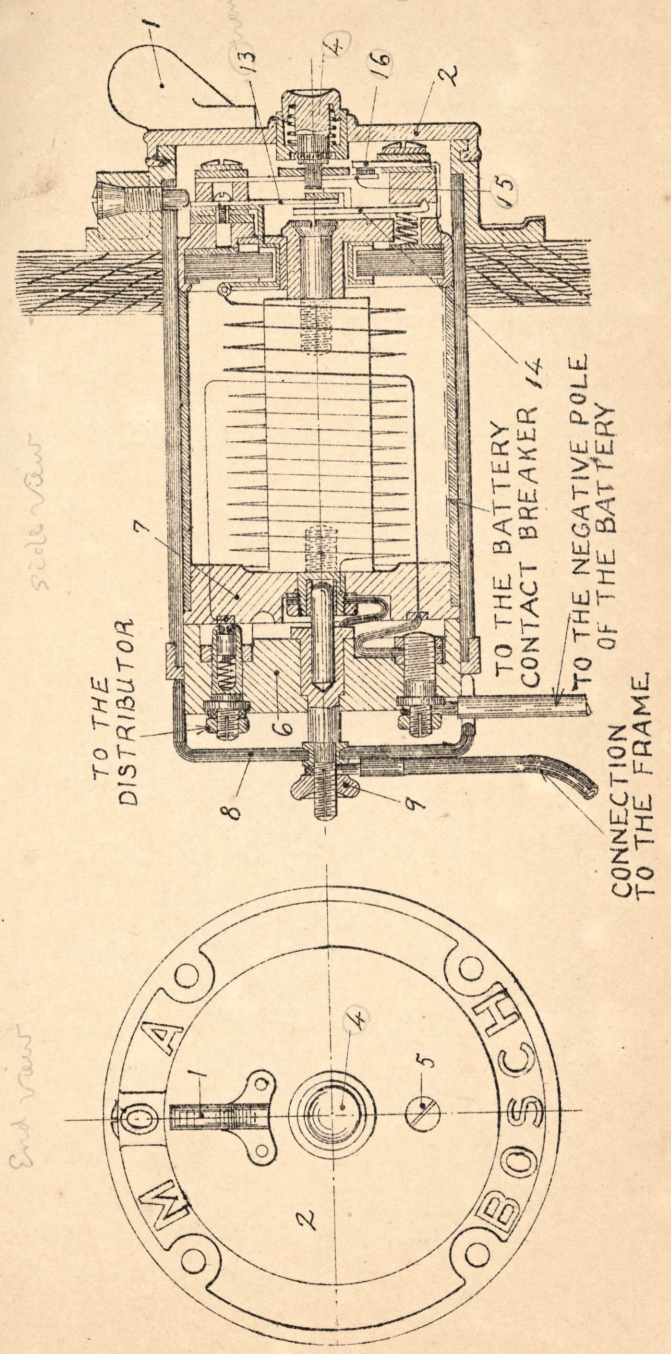


Arrangement of Bosch H.T. Magneto.





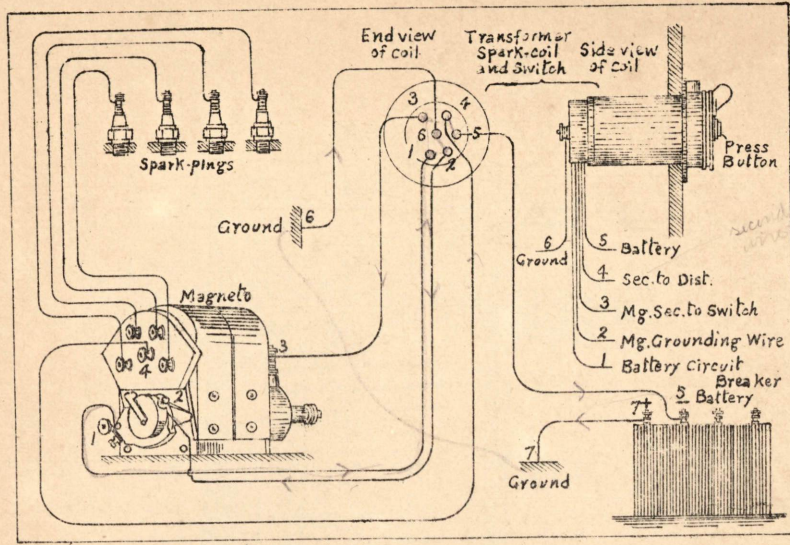
第五十图



第五十一图

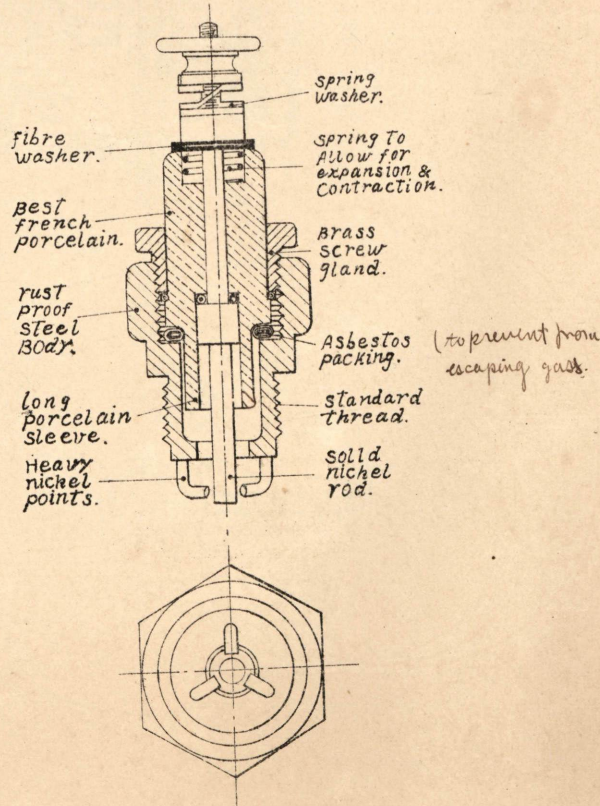


第五十二图



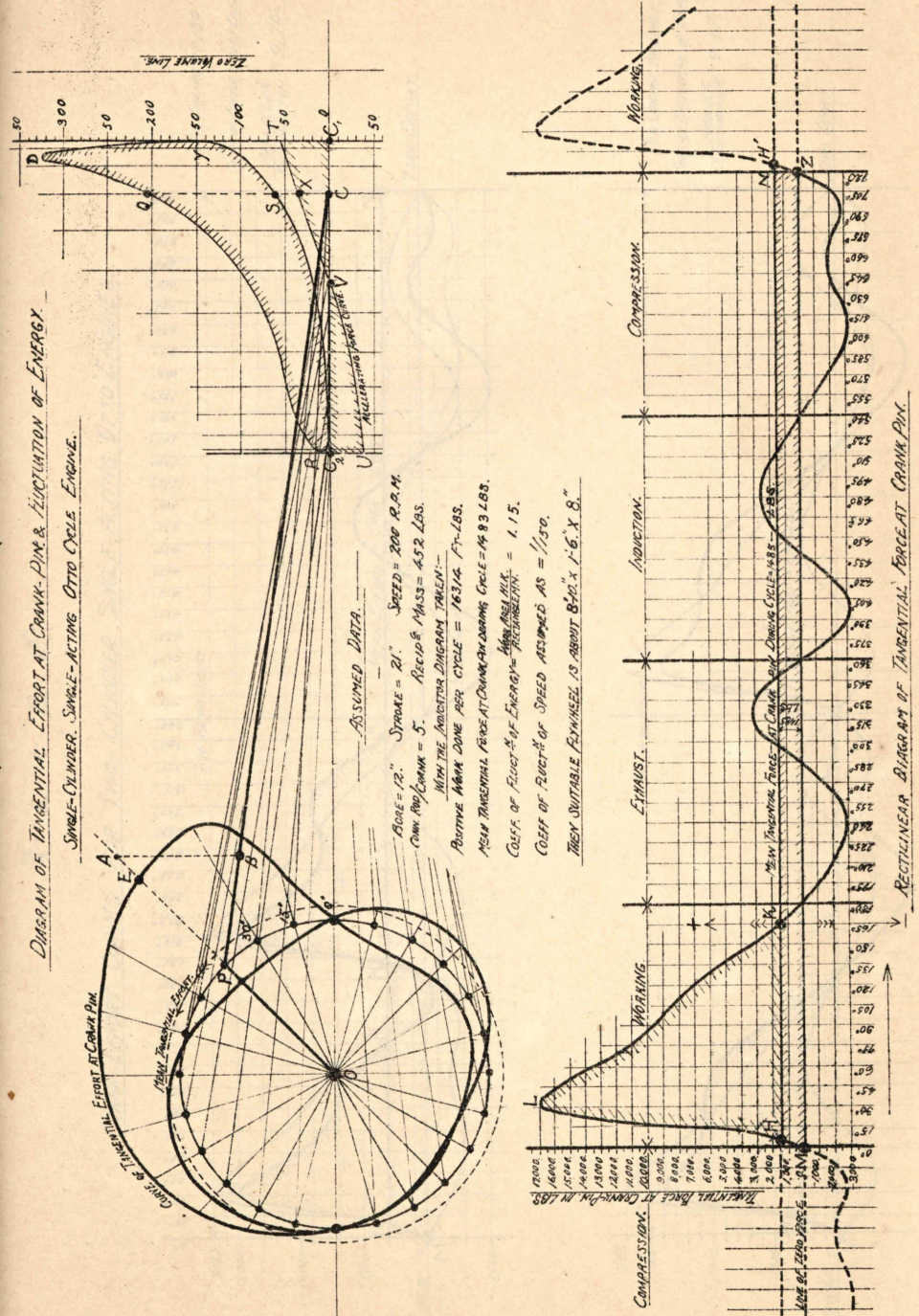
Bosch Dual High-tension Ignition System.

第五十三图

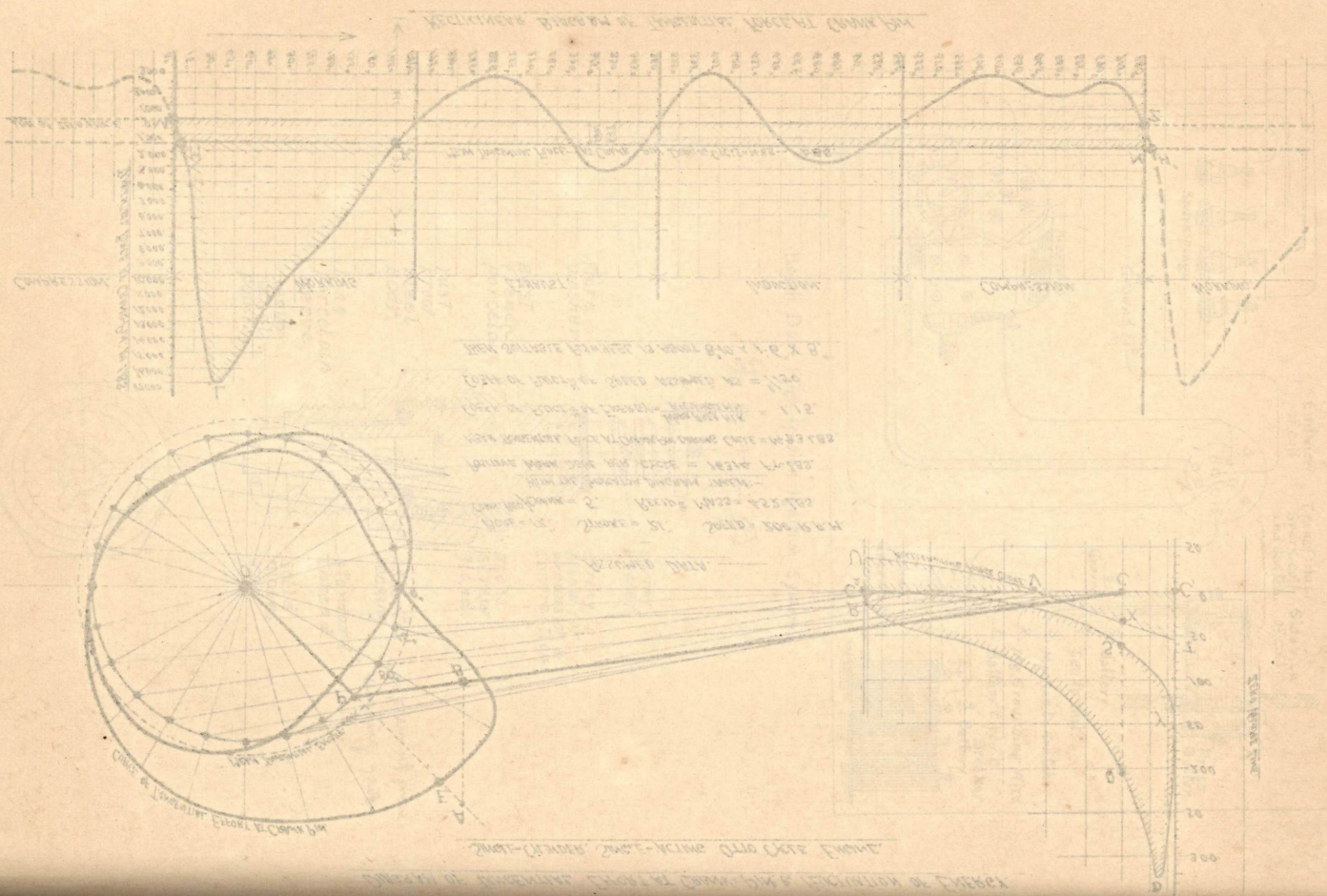


第五十四图

DIAGRAM OF TANGENTIAL EFFORT AT CRANK-PIN & FLUCTUATION OF ENERGY - SINGLE-CYLINDER, SINGLE-ACTING OTTO CYCLE ENGINE.

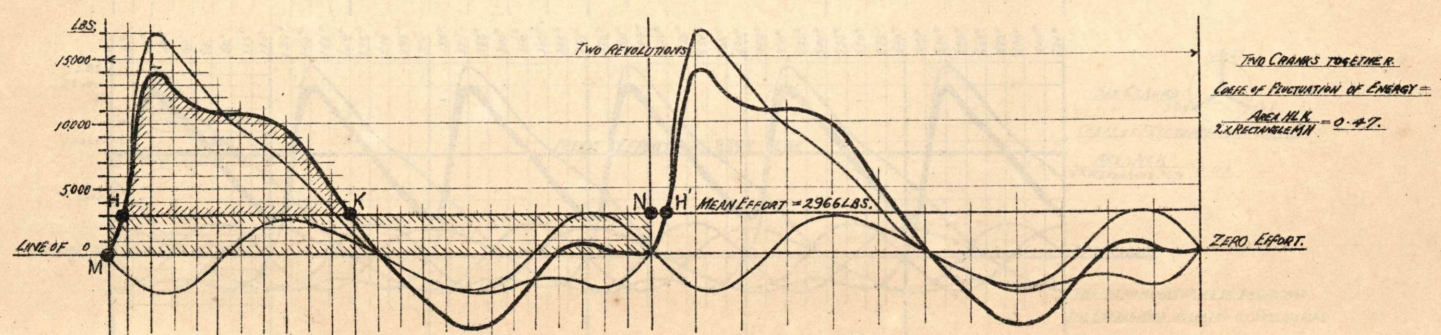
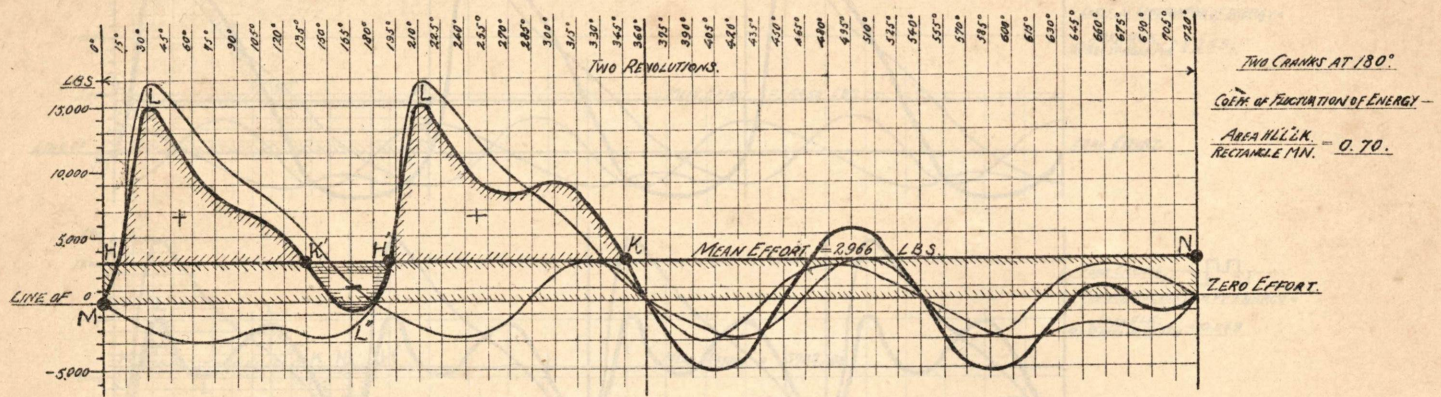




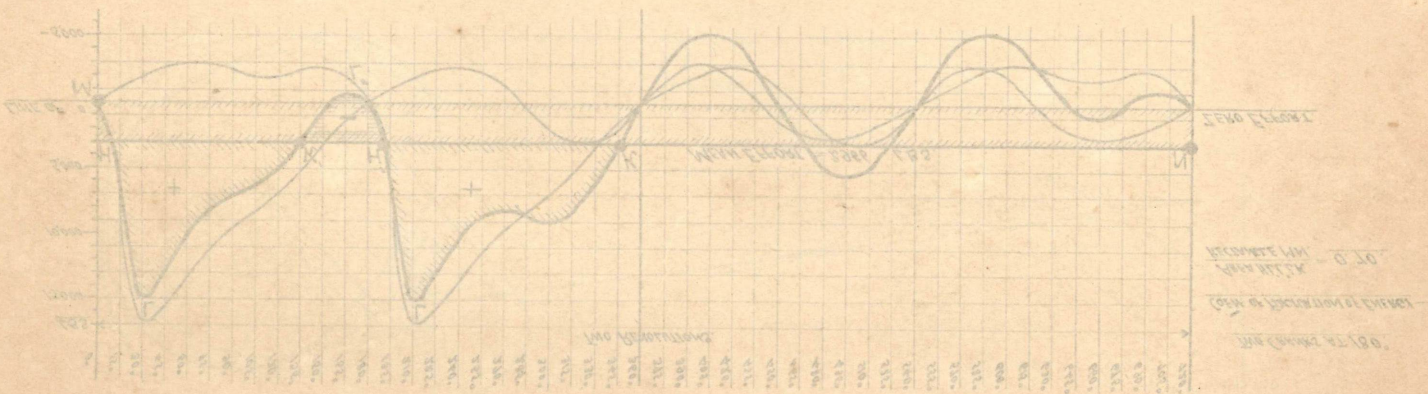
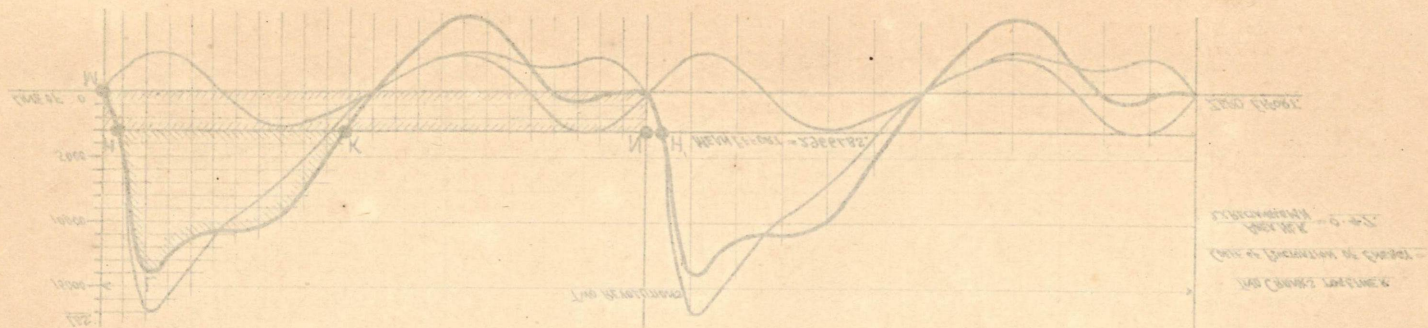


第五十五图

CRANK-EFFORT CURVES FOR TWO-CYLINDER SINGLE-ACTING OTTO ENGINES.



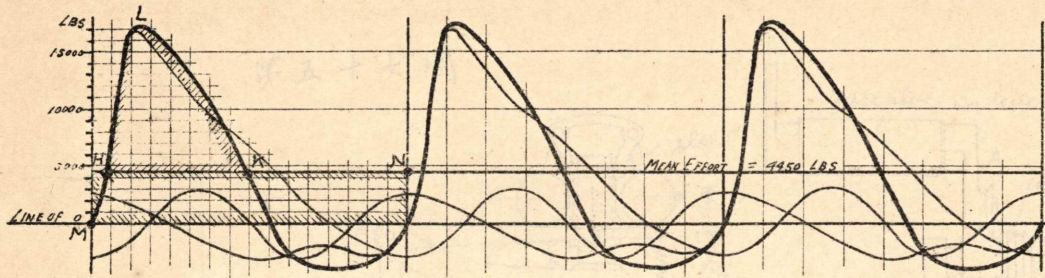




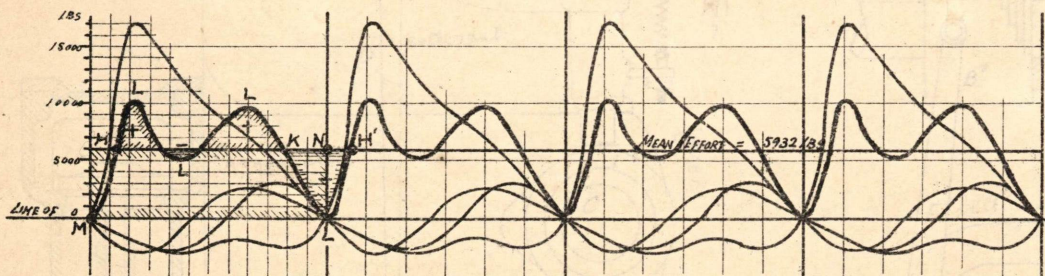
CRANK-EFFORT CURVES FOR THREE, FOUR AND SIX-CYLINDER SINGLE-ACTING OTTO ENGINES.

第五十六图

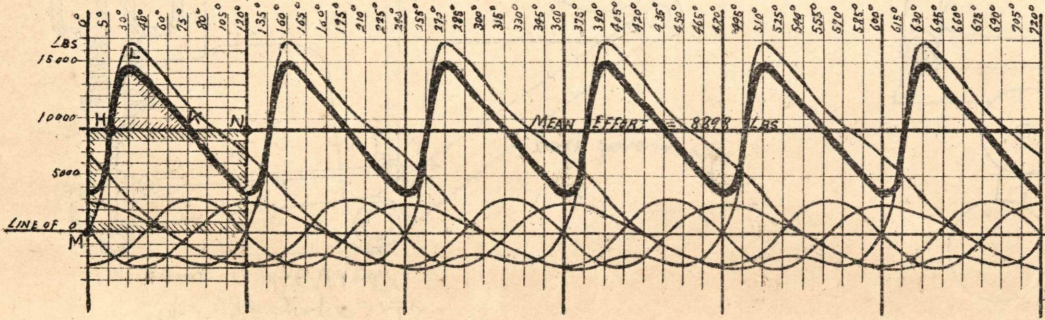
CRANK-EFFORT CURVES FOR THREE, FOUR AND SIX-CYLINDER SINGLE-ACTING OTTO ENGINES.



THREE CRANKS AT 120°  
 COEFF. OF FLUCTUATION OF ENERGY =  
 AREA H.K.  
 3x RECTANGLE MIN = 0.265



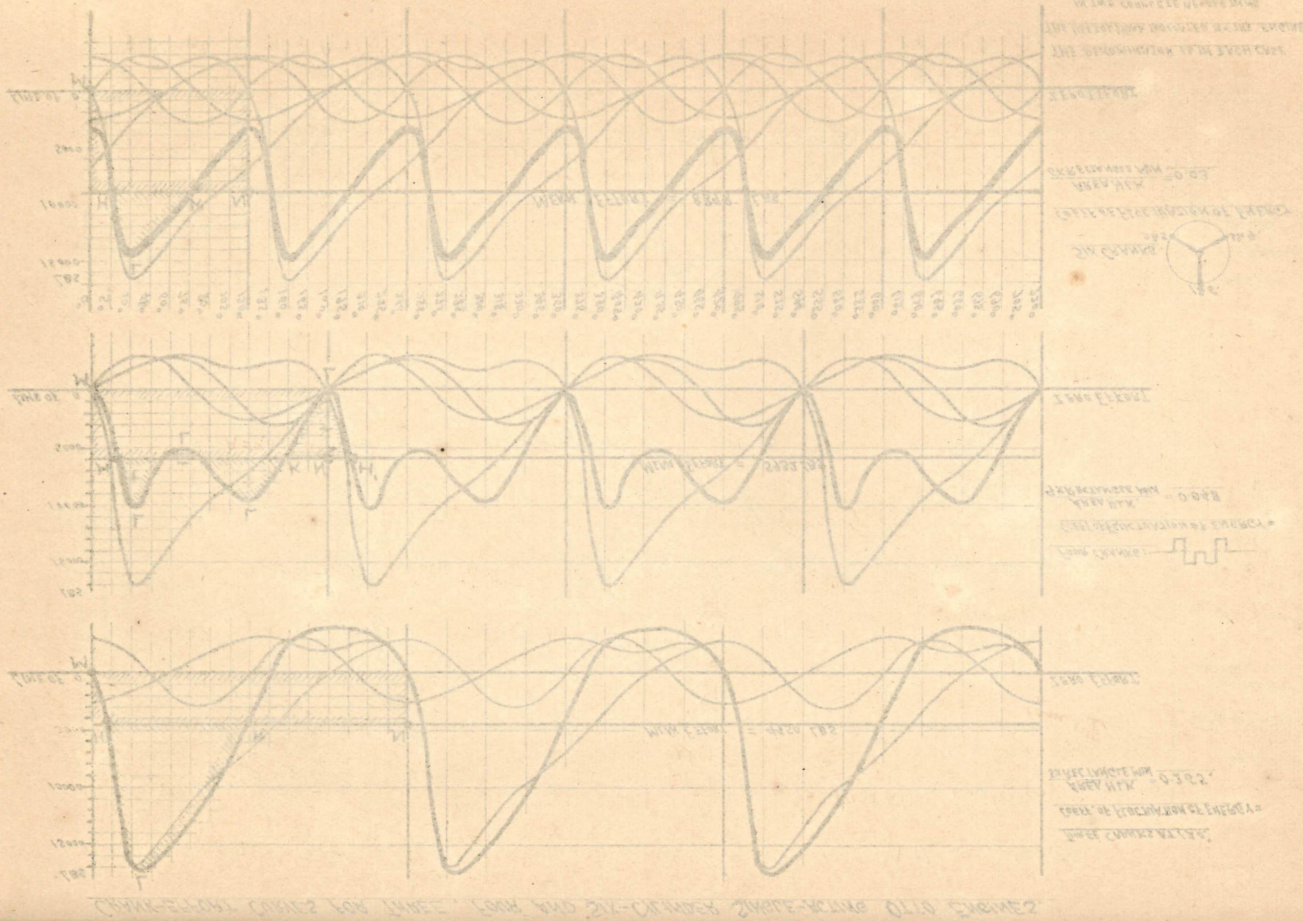
FOUR CRANKS:  
 COEFF. OF FLUCTUATION OF ENERGY =  
 AREA H.K.  
 4x RECTANGLE MIN = 0.048



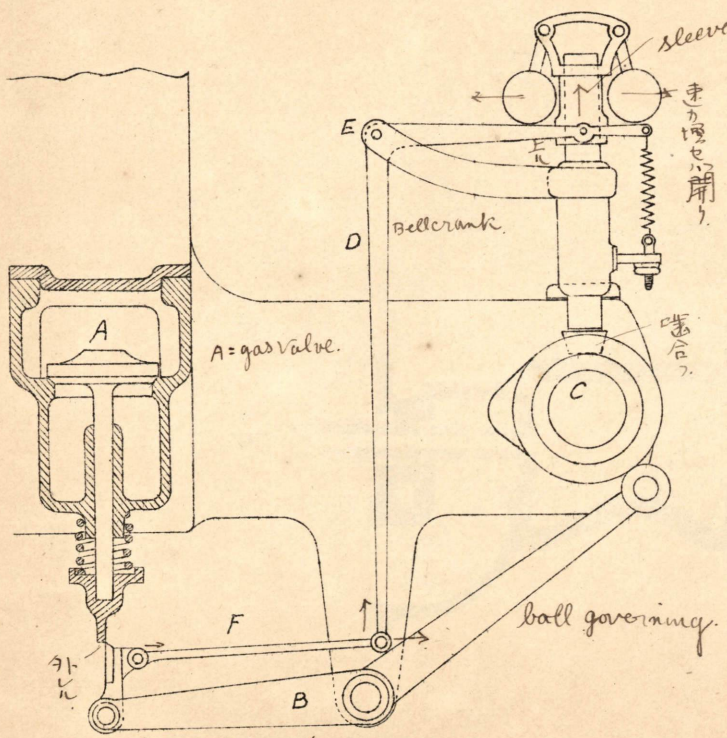
SIX CRANKS:  
 COEFF. OF FLUCTUATION OF ENERGY =  
 AREA H.K.  
 6x RECTANGLE MIN = 0.03

THE DENOMINATOR IS IN EACH CASE  
 THE USEFUL WORK INDICATED BY THE ENGINE  
 IN TWO COMPLETE REVOLUTIONS



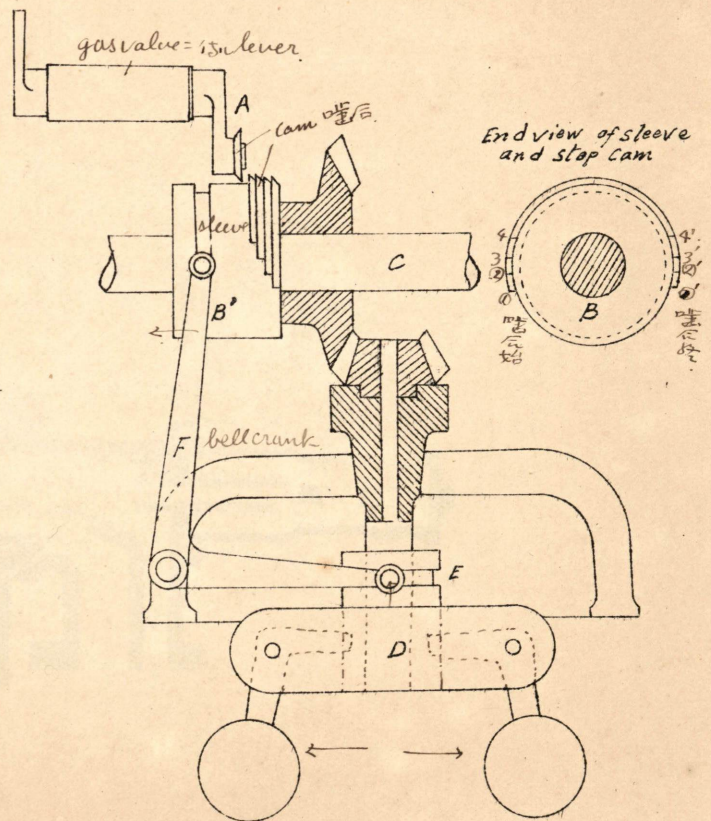


第五十七图



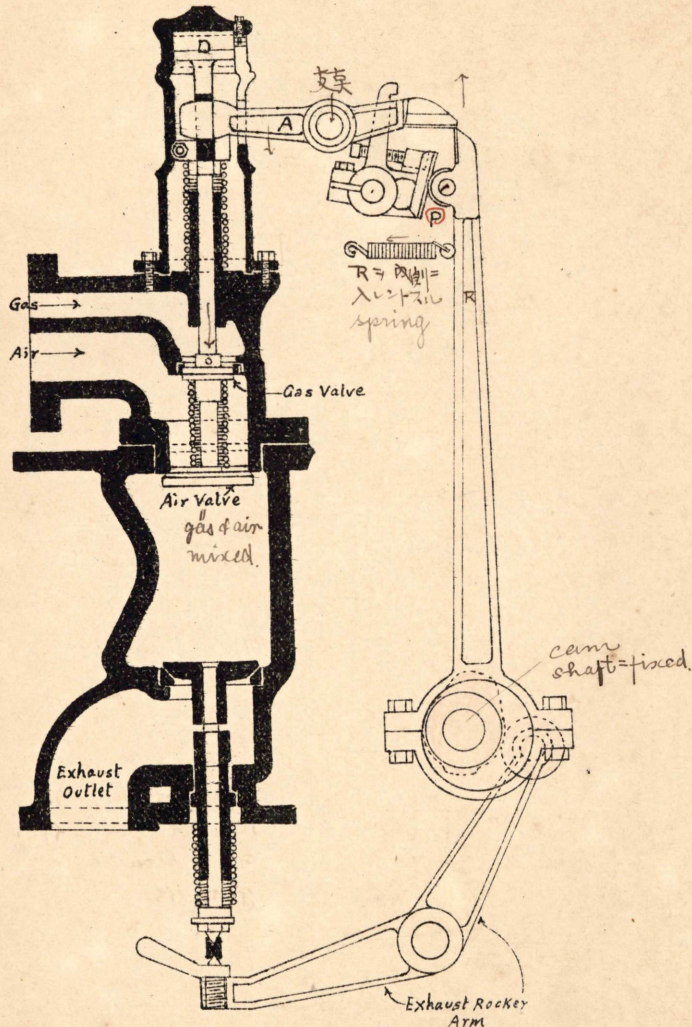
cam 1173 行 A 7 行  
 従 9 dle stroke 行

第五十八图



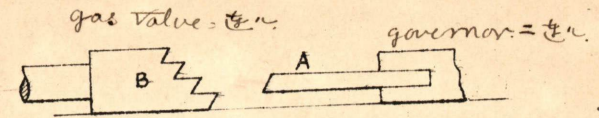


第五十九图

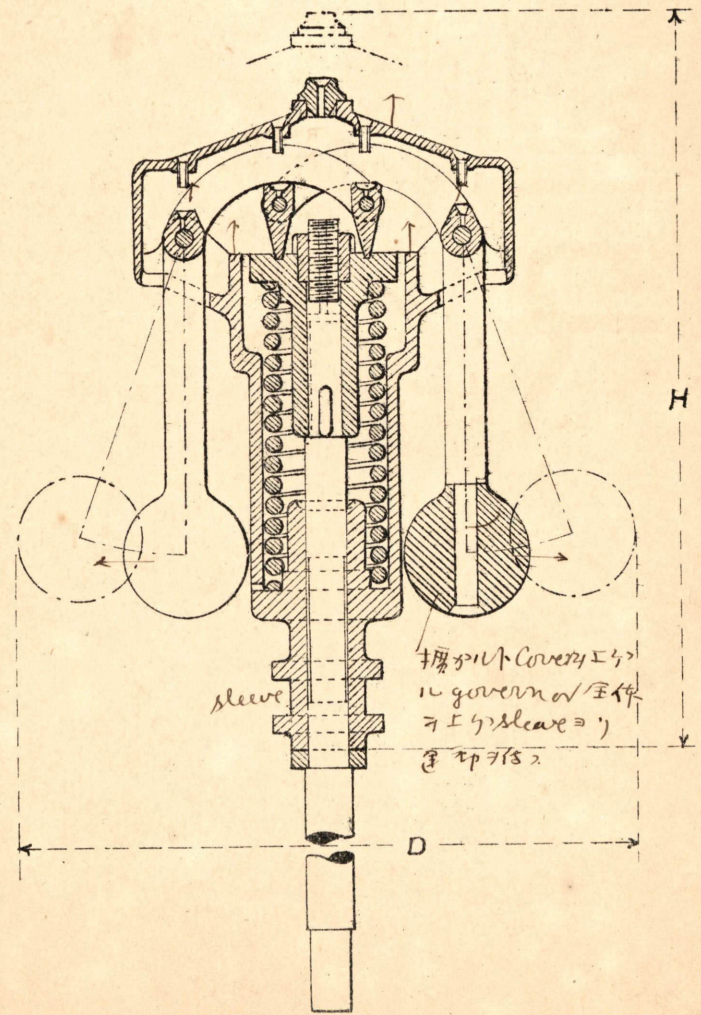


AN AUTOMATIC CUT-OFF GOVERNOR MECHANISM.

第六十图

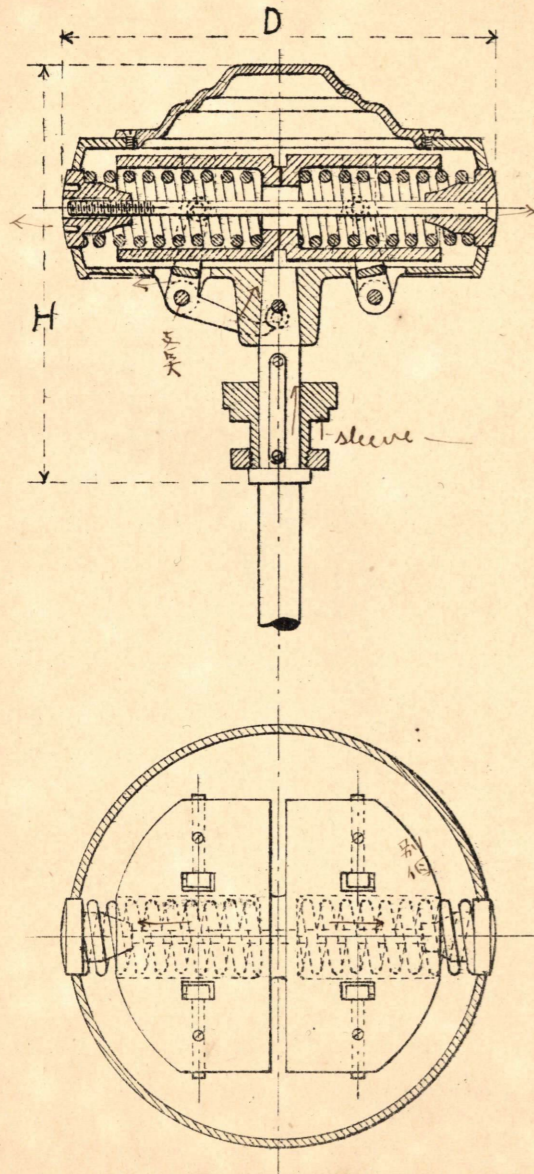


第六十一图



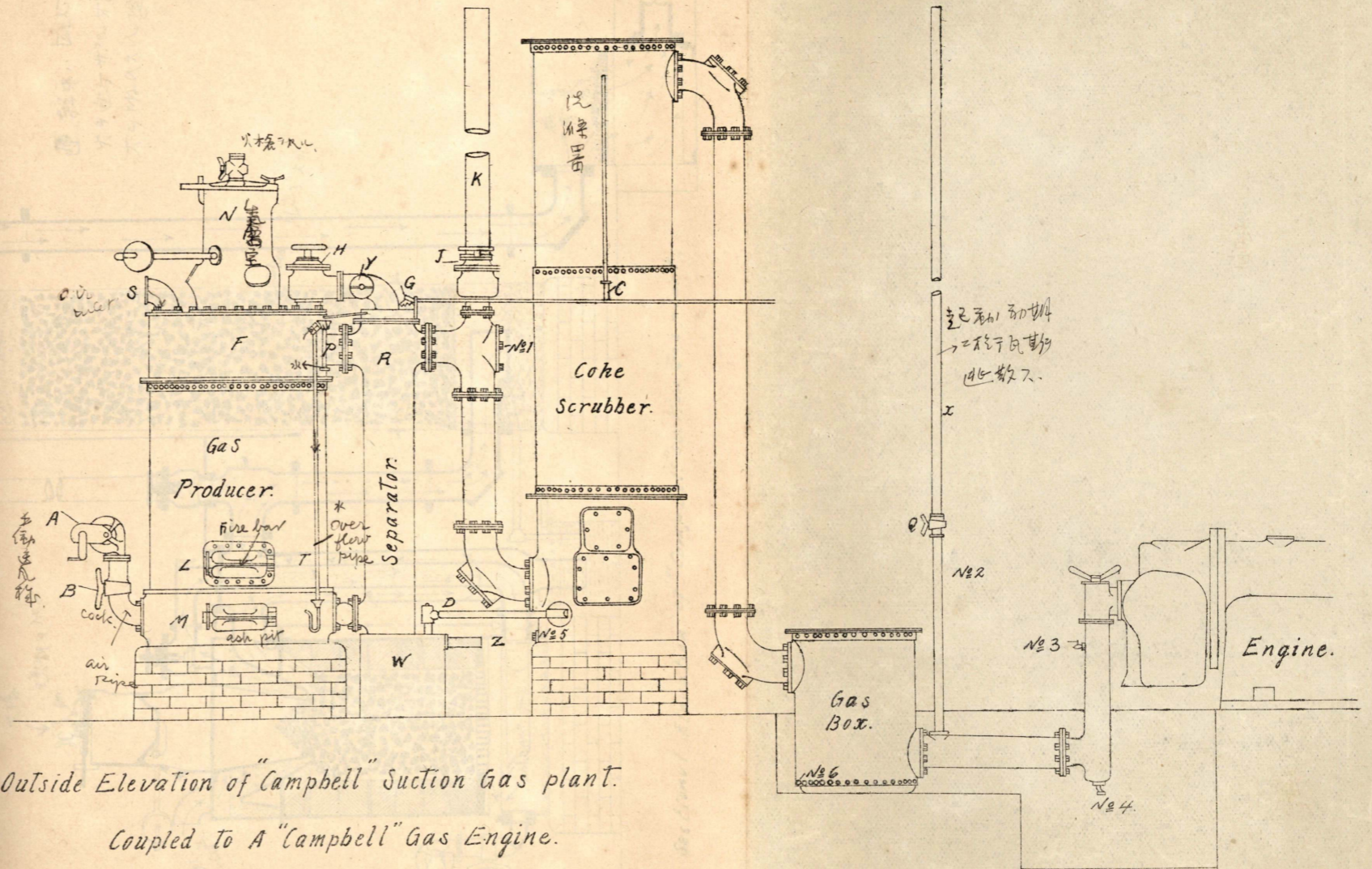


第六十二圖



本機實馬力  
25 HP.

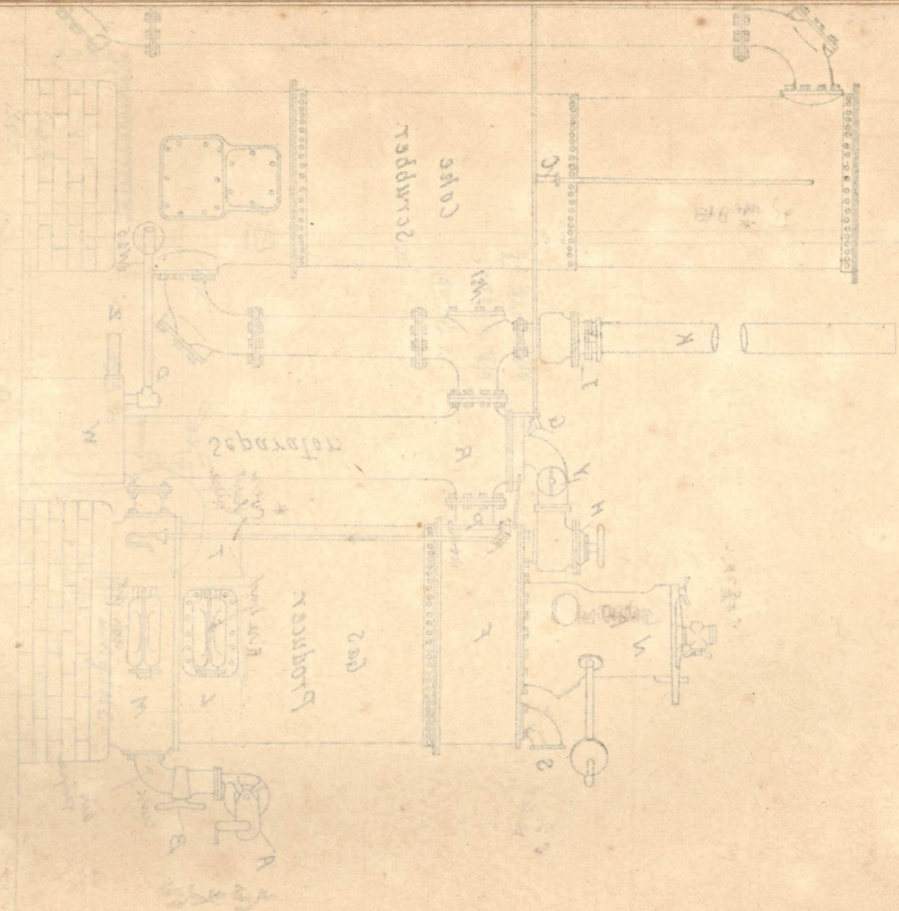
第六十三圖



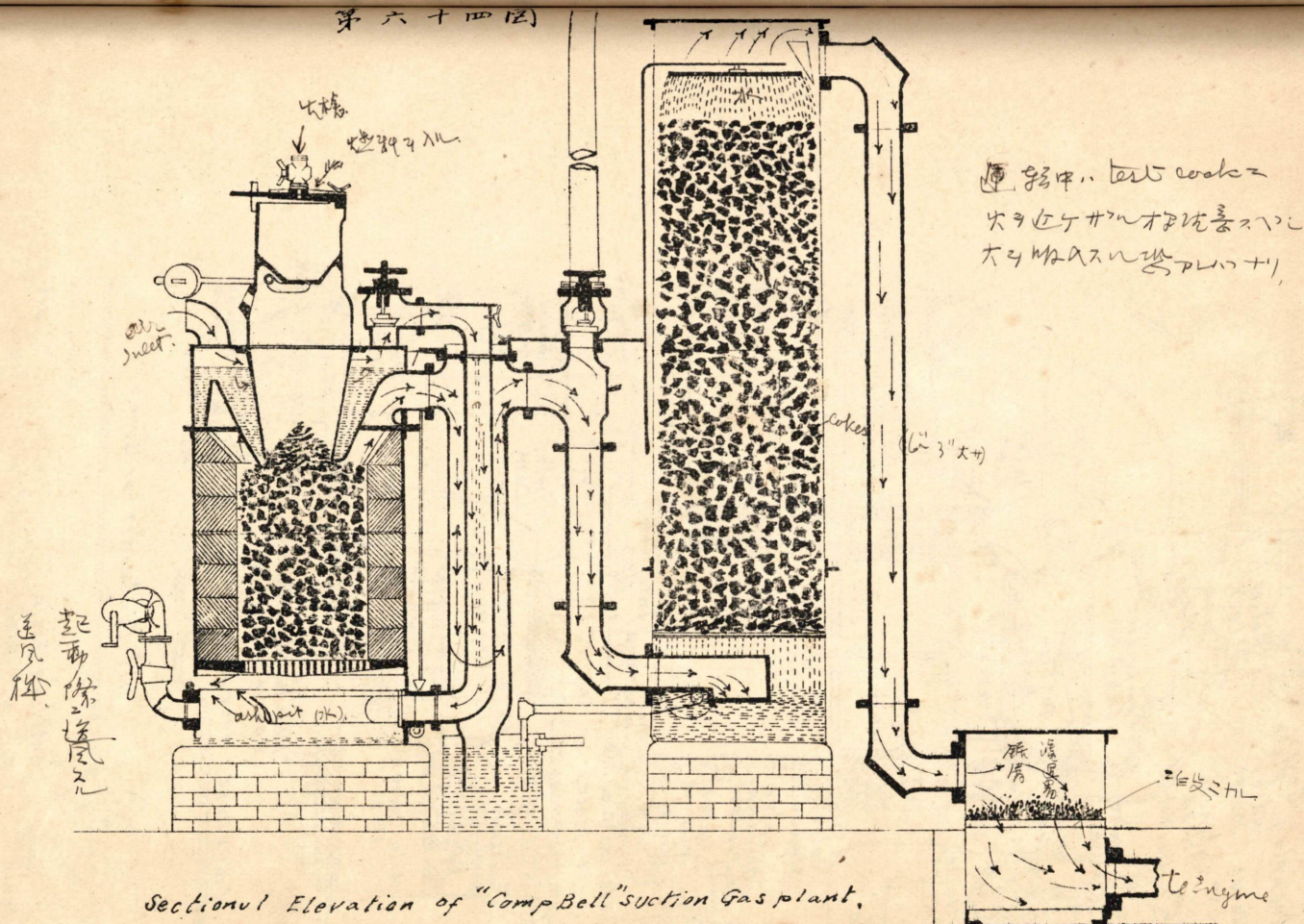
Outside Elevation of "Campbell" Suction Gas plant.  
Coupled to A "Campbell" Gas Engine.



Sectional Elevation of Campbell's Suction Gas Plant



第六十四图



運轉中、test coals =  
 火子近付サハ木炭等入ル  
 大ク煤油等入ル

Sectional Elevation of "Camp Bell" Suction Gas plant.



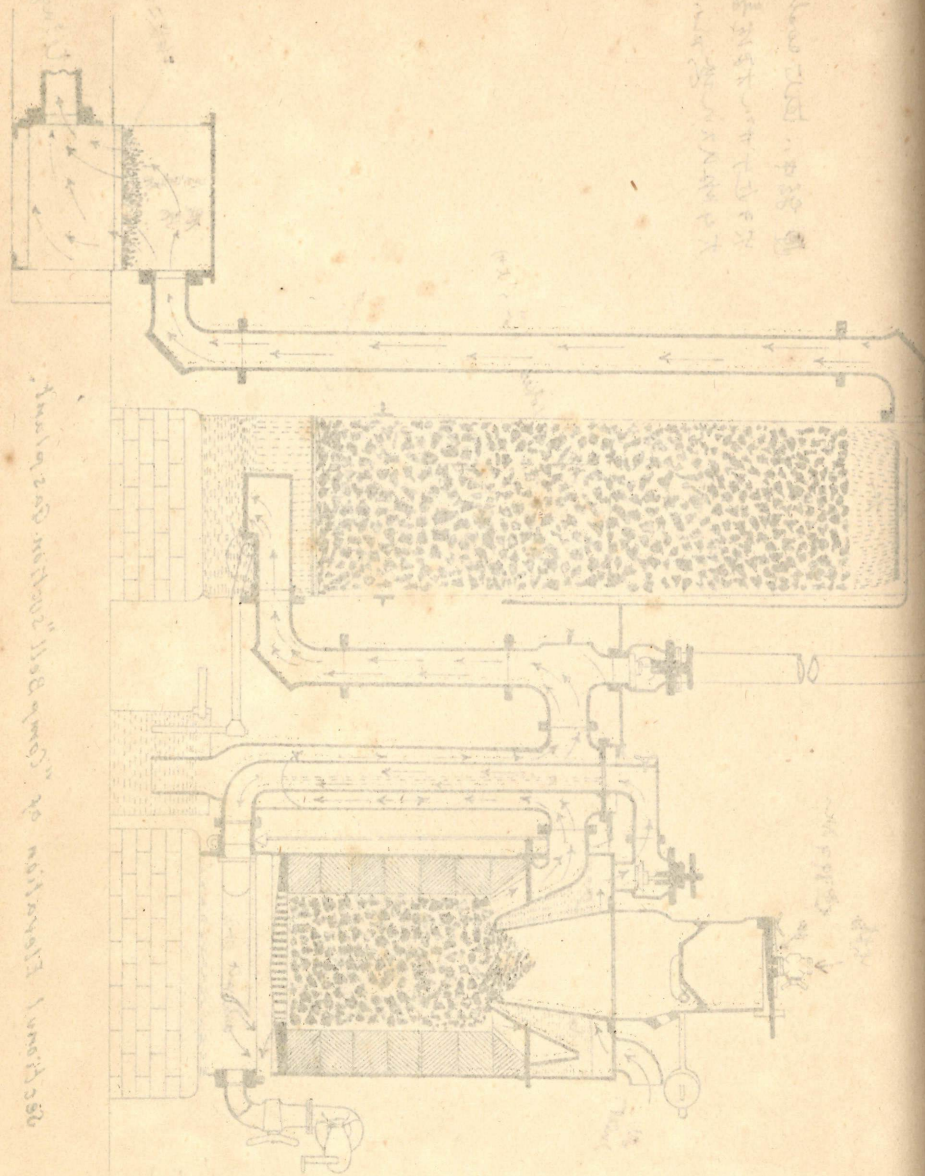
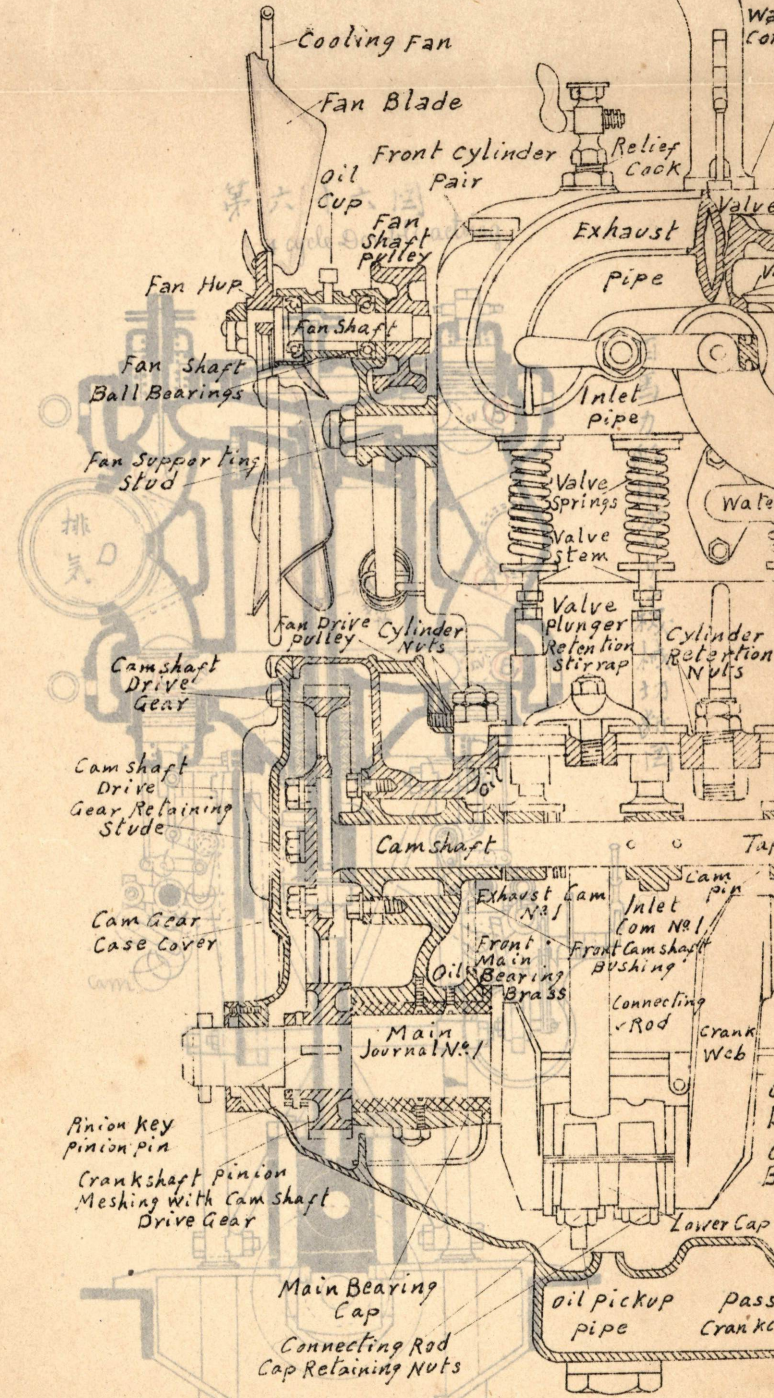
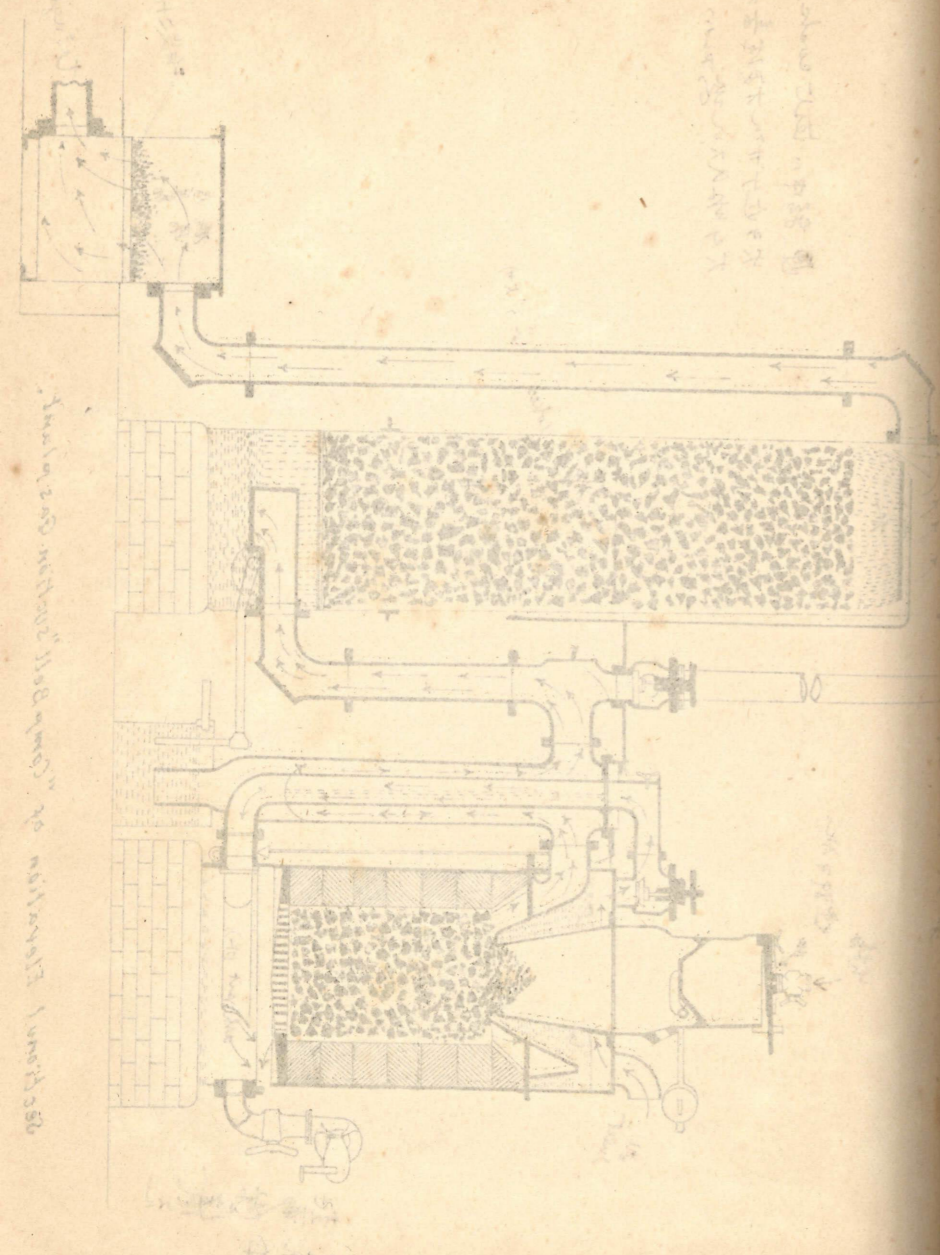
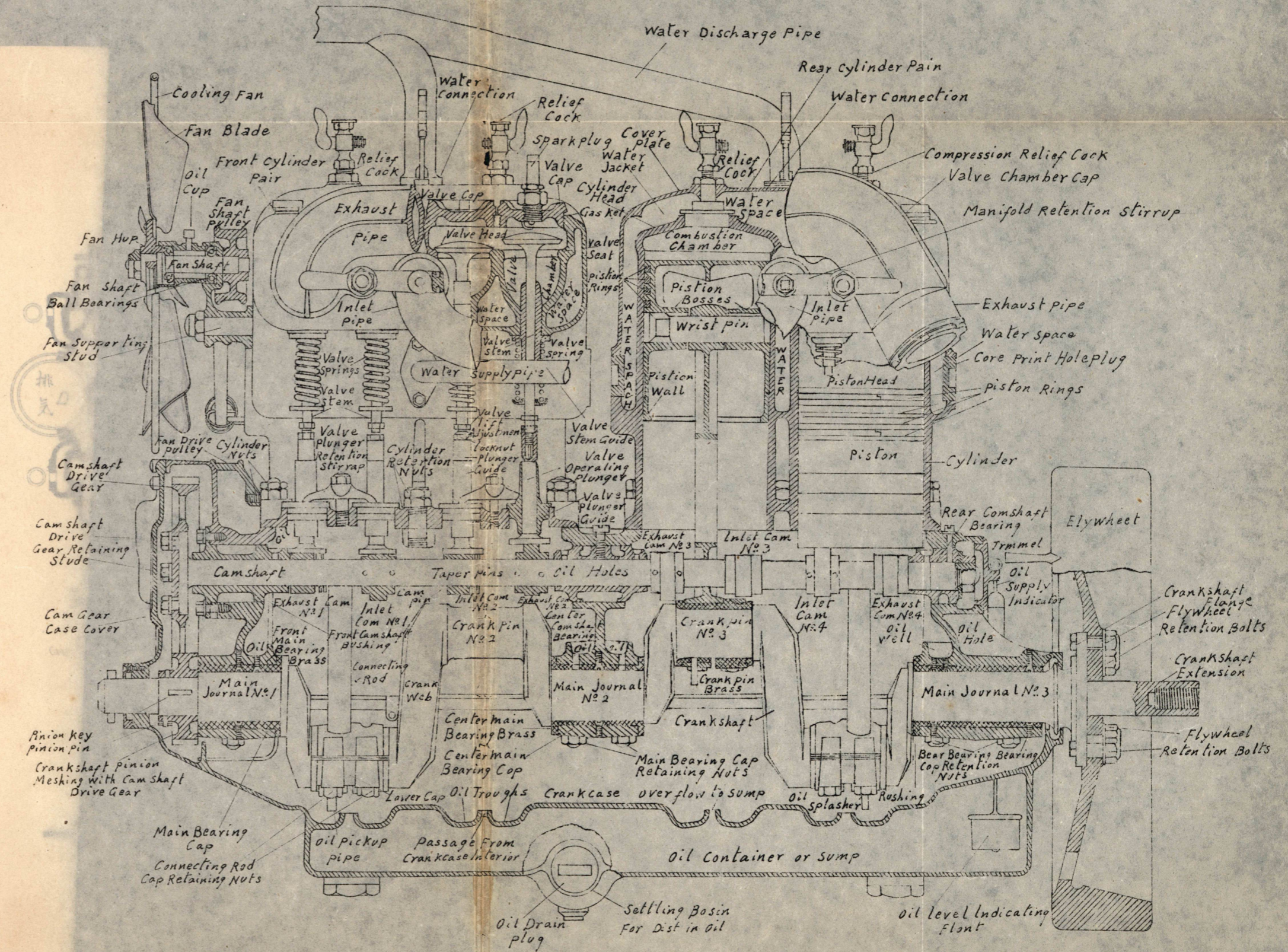


Fig. 120. "Water" "1880" No. 1817/17. 1/10/1880

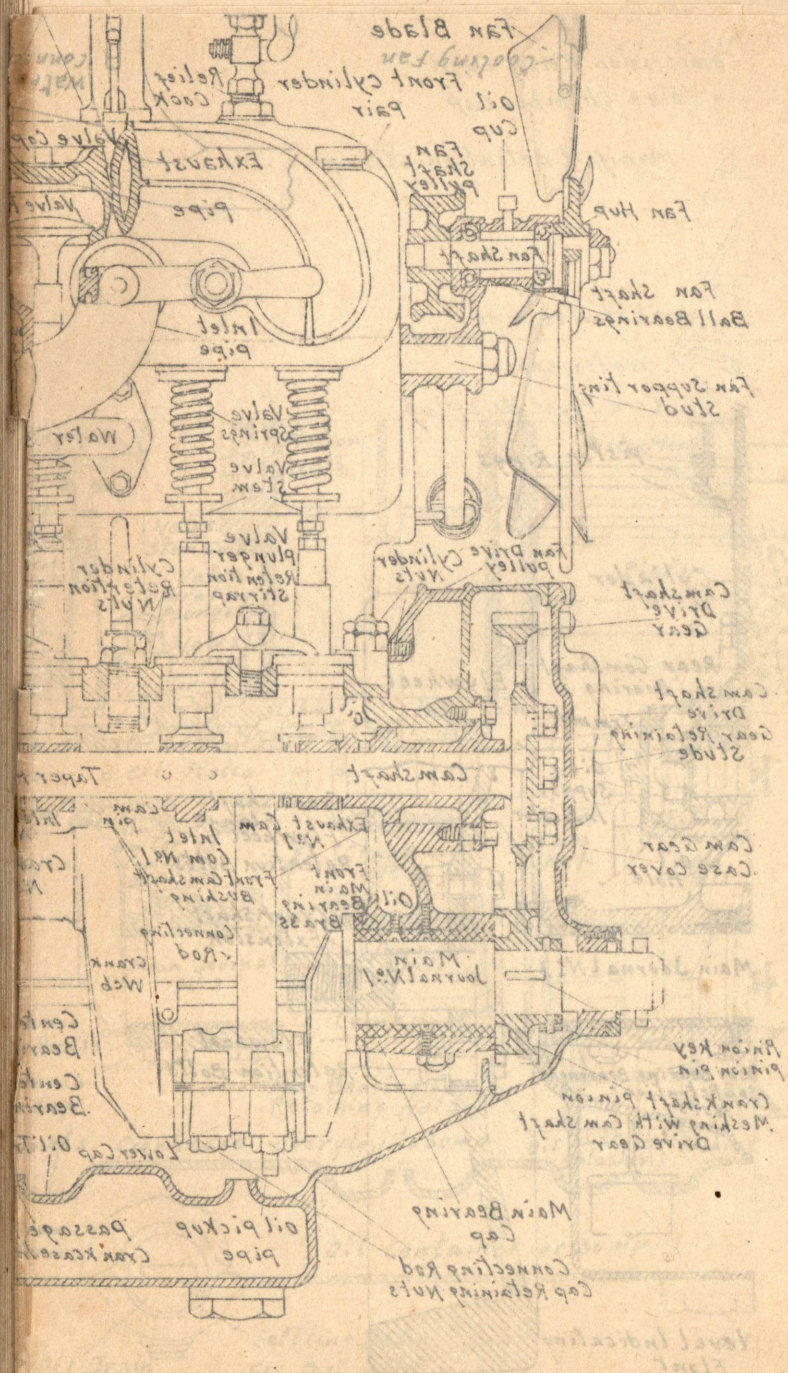




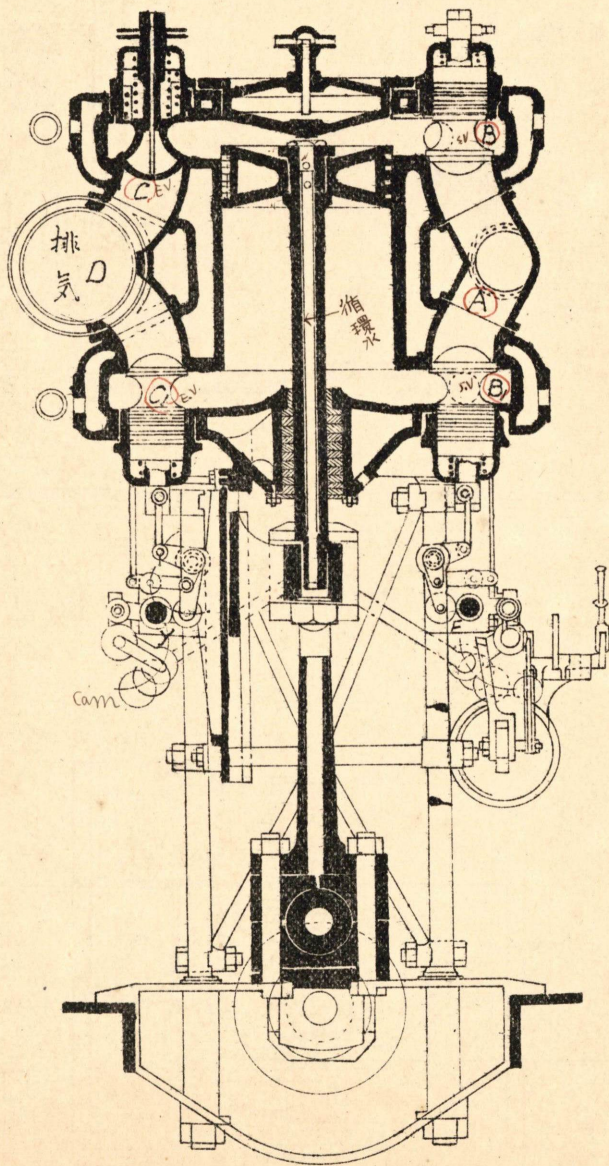
第六十五图







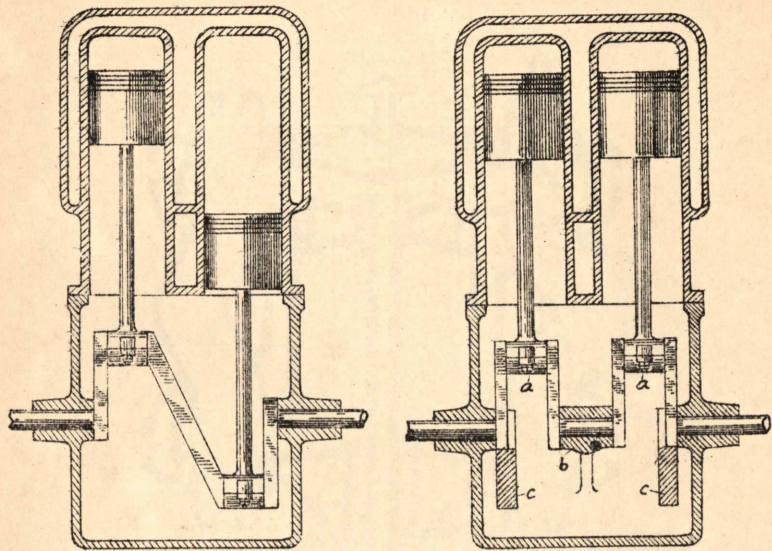
第六十六圖  
4 cycle Double acting



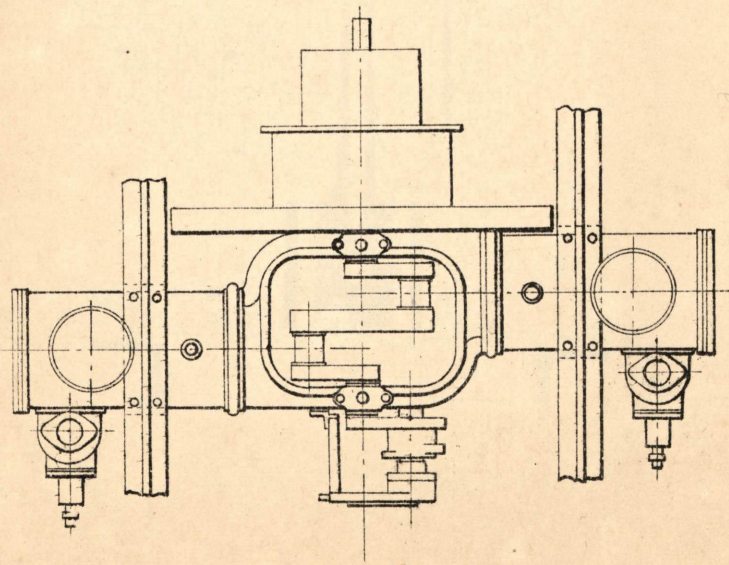
百馬力船用ガソリン機械切斷図



第六十七图



第六十八图



第六十九图

