

Required a spring to have  
at fitted load of 45LBS.

$$X = \frac{64.45 \cdot (.4)^3 \cdot 9}{12,500,000 \cdot (.128)^4} =$$

$$\frac{1775}{12,500,000 \times .000268} = .53$$

$$1.8 + .53 = 2.33 \text{ "free length"}$$

85 LBS. per inch.

load with valve lifted = 77 LBS.

Must compress to  $1\frac{5}{16}$ "

Speedometer reading on  
tachometer facing

car moves  $81\frac{1}{2}$ " per rev. of road  
wheel.

With 4.0 to 1 gear  
engine turns @

$$\frac{1760 \times 36 \times 4}{81.5}$$

$$= 3110 \text{ RPM @ } 60 \text{ MPH}$$

R.P.M	4.0	4.5	5.0	5.5
1000	19.3	17.2	15.4	14.0
1500	29.3	25.7	23.2	21.0
2000	38.6	34.3	30.8	28.0
2500	48.3	42.8	38.6	35.0
3000	57.9	51.4	46.3	42.0
3500	67.5	60.0	54.0	49.0
4000	77.3	68.5	61.7	56.0
4500	86.7	77.1	69.5	63.0
5000	96.5	85.6	77.1	70.0

(20HP) with 3 to 1 top  
1700 R.P.M @ 60 MPH.

$$P = \frac{F \cdot G \cdot d^5}{8 \cdot D^3 \cdot h}$$

where

$P$  = load in lbs

$F$  = deflection in ins. (or extension)

$G$  = 12,000,000

$d$  = dia. of wire

$D$  = mean coil dia.

$h$  = solid height (or length) of coils when compressed solid

$$\text{Stress in lbs per } \square'' = \frac{8 \cdot D \cdot P}{3 \cdot 14 \cdot d^3}$$

Carb. for 7HP Engine (Standard)

Zenith Type 22 F.

22 mm. Outlet

15 mm. Choke Tube

Main jet 70

Comp. jet 75

Brake shoe spring -  $\frac{1}{4}$ " Bar

Required a spring thus:



Fitted length  $A = 3\frac{1}{2}$ ",  $B = \frac{1}{2}$ " OD. =  $\frac{11}{32}$ "  
to give a load of approx 29 lbs. in fitted position

let  $x$  = extension

$$\text{Then } 29 = \frac{x \times 12,000,000 \times (.064)^5}{8 \times (.280)^3 \times (2.5 - x)}$$

$$29 = \frac{x \times 12,000,000 \times .000001}{8 \times .022 \times (2.5 - x)}$$

$$= \frac{6.3 x}{.22 - .088 x} = 8.55 x = 638$$

$$\text{extension} = .72''$$

Above is worked out for 16 swg.

$$S = 78,000 \text{ lbs. per } \square''$$



$$\frac{x \times 12,600,000 \times (.054)^5}{8 \times (.288)^3 \times (2.5 - x)}$$

$$\frac{x \times 12,600,000 \times .000000552}{8 \times .0239 \times (2.5 - x)}$$

.191

$$= \frac{7.0 x}{.478 - .191 x} = 29$$

12.54 x = 13.9  
 extension = 1.1" to give 29 LBS.

Above using 17 SWG wire  
 S = 121,000

12 HP head standard.

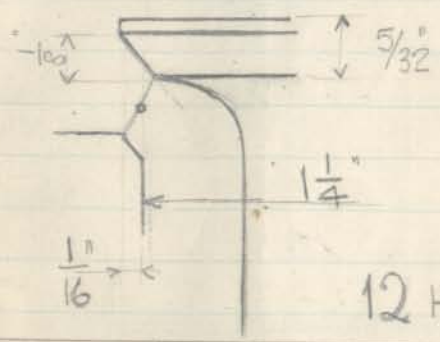
head capacity = 80 cc.  
 joint washer = 26 cc  
 total = 106

$$\text{cyl capacity } (72 \frac{1}{16} \times 4") = 413.66$$

$$\frac{413.66 + 106}{106} = 4.9$$

Cyl. head for 2 litre engine

Cyl capacity  $(3 \frac{1}{8} \times 4") = 502.5 \text{ cc.}$   
 To give a compression ratio of 5:1. Total cyl head capacity = 122 cc



5/16 LIFT  
 Ring area = 10" approx.  
 12 HP. Valve etc

7 HP. Performances etc. 1923

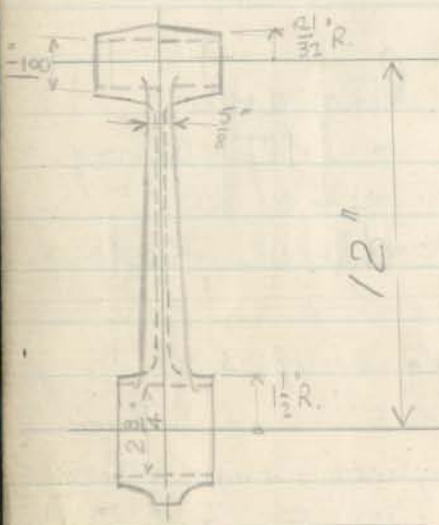
1st Monza track @ 59 mph.  
 1st Brooklands (Gordon England) 5 3/4 m. @ 67 mph.  
 same meeting 1 record & 1 third

1st week Sept.

Brooklands G. England's racer  
 Puts up new records in 750 cc. class  
 5 miles @ 80 mph.

Engine  $4\frac{3}{8} \times 6 \times 4.02$

Gudgeon pin  $\frac{13}{16}$  O.D  $\times 2\frac{1}{8}$  (drilled  $\frac{1}{8}$  dia)  
 little end bearing  $2\frac{1}{4}$ " long.  
 Big end bolts  $\frac{1}{16}$  dia.  
 Crankshaft gear  $1\frac{1}{4}$ " wide.



Speeds of  $3\frac{1}{2}$  HP Ricardo-Triumph gears

Engine R.P.M	4.5	7.47	12.46
1000	18.2	11	6.6
1500	27.3	16.5	9.9
2000	36.4	22	13.2
2500	45.5	27.5	16.5
3000	54.6	33	19.8
3500	63.7	38.5	23.1
4000	72.8	44	26.4
4500	81.9	49.5	29.7

Wheel  $26 \times 3$ " (700 x 80)  
 Transmission  $\frac{5}{8} \times \frac{1}{4}$  chain (front oil-bath)  
 $\frac{5}{8} \times \frac{3}{8}$  chain rear.  
 Single cylinder  $80.94 \times 97 = 499$  cc.  
 4 valves per cyl. 2 inlet 2 exhaust.  
 Detachable head. Ricardo slipper piston.  
 Standard model speed between 60 & 65  
 climb 1 in 9 up to (indefinitely?)

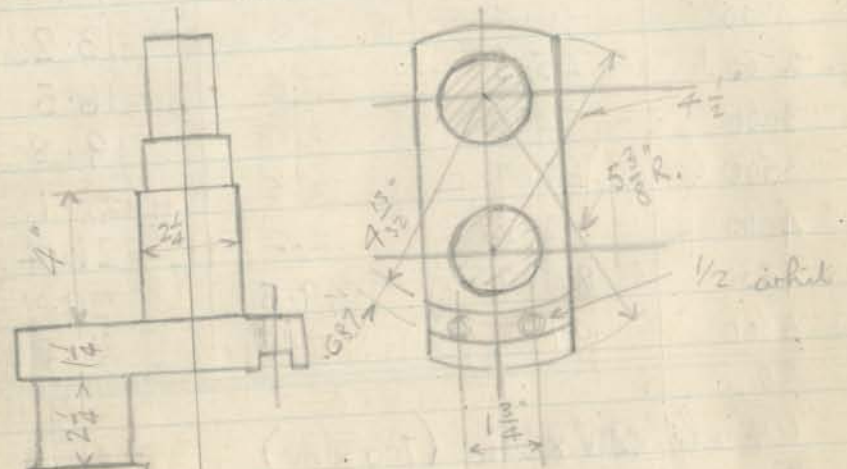
HP = 12 HP @ 4000 R.P.M low-compression  
 13 1/2 HP @ 4000 R.P.M high compression  
 MEP 78 & 88 lbs. per sq. in.

These notes apply only to ordinary standard engines.

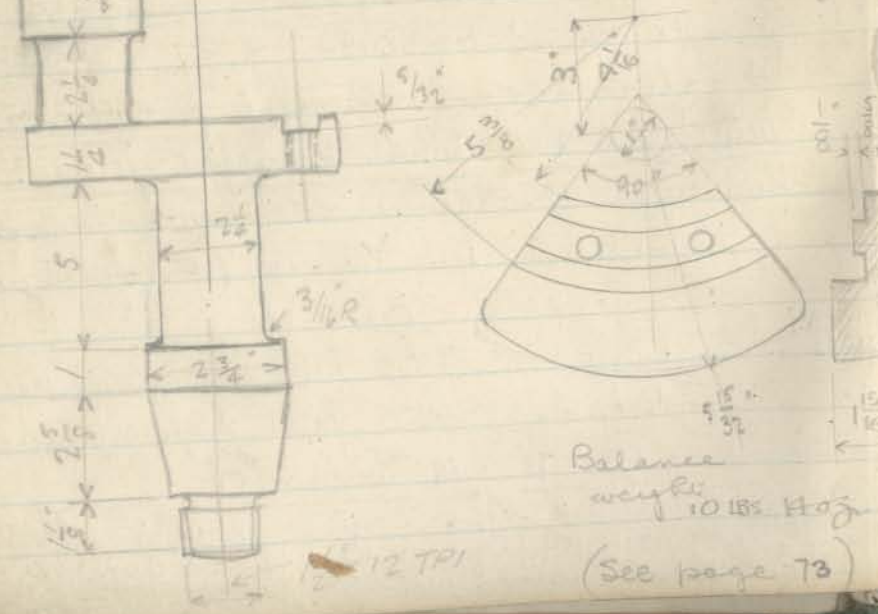


Engine  $4\frac{3}{8} \times 6 \times 2$

Coupled to Electric Power Co. Ltd.  
 dynamo -  $6\frac{1}{2}$  KW. @ 850 RPM.  
 100 - 150 Volt, 45 Amp.



Crankshaft 5  
 Balance weight



Balance weight  
 10 lbs Hoop  
 (See page 73)

Close gearbox ratios for 4HP Racers.

- 1) 1st motion shaft wheel - 16 (FW 177 P.C)
- 2) Layshaft wheel - 25

$$1) \frac{17}{8} = 2.125" = \text{P.C.D.}$$

$$\text{O.D.} = 2.125" + .2" = \frac{2.325"}{2.325}$$

$$2) \frac{25}{8} = 3.125" = \text{P.C.D.}$$

$$\text{O.D.} = 3.125" + .2" = \frac{3.325"}{3.325}$$

2nd Speed reduction =  $\frac{25}{16} \times \frac{17}{24} = 1.15"$

(using XA 904/5 Special 2nd spd. wheels)  
 = 5 to 1 seconds. with 45 top.)

1st Speed reduction =  $\frac{25}{16} \times \frac{26}{16} = 2.54$

1st. Speed = 11.4 To 1

2nd spd. using standard 2nd speed wheels =  $\frac{25}{16} \times \frac{22}{20} = 1.72 = 7.75$