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IC ENGINE TESTING



BASIC MEASUREMENTS

The basic measurements to be undertaken to evaluate the performance of an engine on almost all tests are the following

- (a) Speed
- (b) Fuel consumption
- (c) Air consumption
- (d) Smoke density
- (e) Brake horse-power
- (f) Indicated horse power and friction horse power
- (g) Heat going to cooling water
- (h) Heat going to exhaust
- (i) Exhaust gas analysis.
- In addition to above a large number of other measurements may be necessary depending upon the aim of the test.



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Measurement of speed

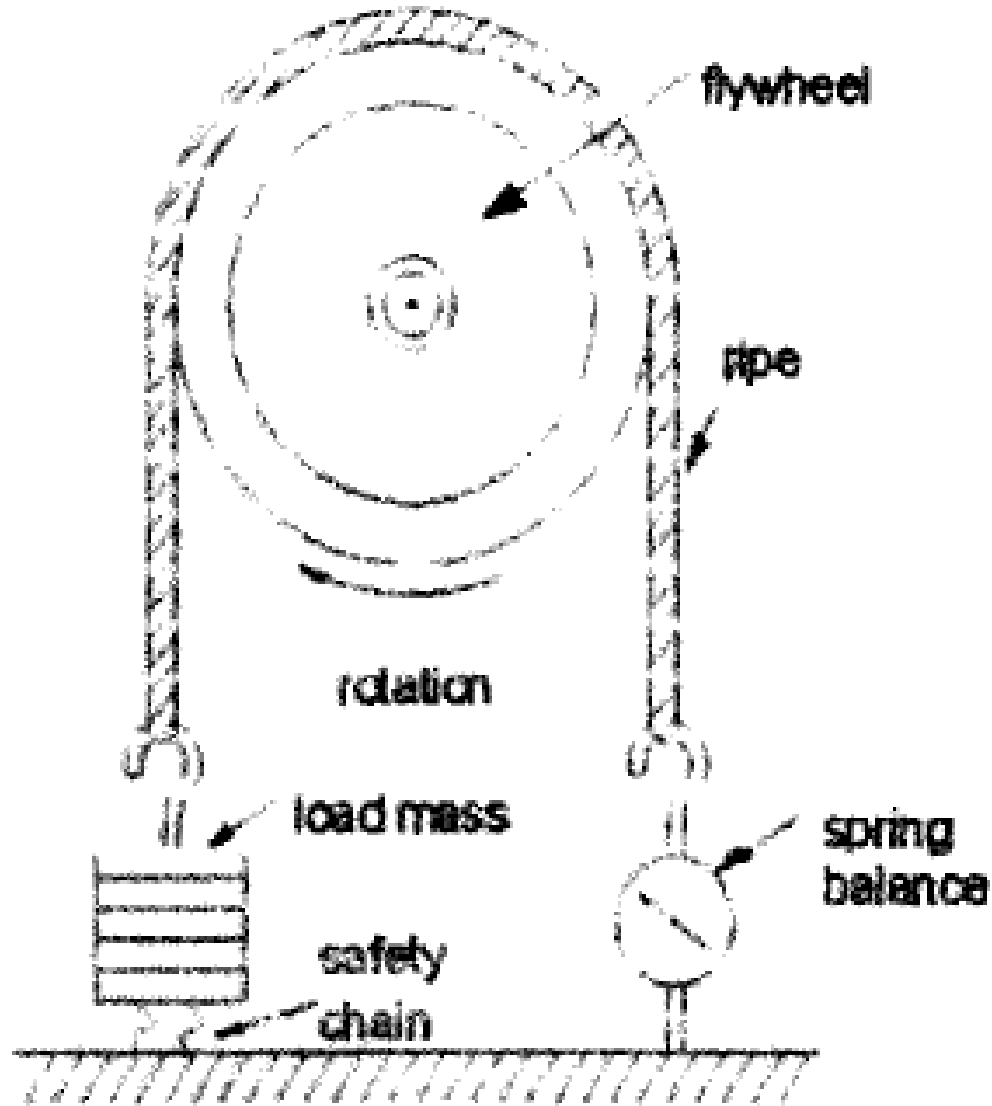
- A wide variety of speed measuring devices are available in the market. They range from a mechanical tachometer to digital and triggered electrical tachometers.

- The best method of measuring speed is to count the number of revolutions in a given time.
- A mechanical tachometer or an electrical tachometer can also be used for measuring the speed.
- The electrical tachometer has a three-phase permanent-magnet alternator to which a voltmeter is attached. The output of the alternator is a linear function of the speed and is directly indicated on the voltmeter dial.
- Both electrical and mechanical types of tachometers are affected by the temperature variations and are not very accurate.
- For accurate and continuous measurement of speed a magnetic pick-up placed near a toothed wheel coupled to the engine shaft can be used. The magnetic pick-up will produce a pulse for



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ROPE DYNAMOMETER





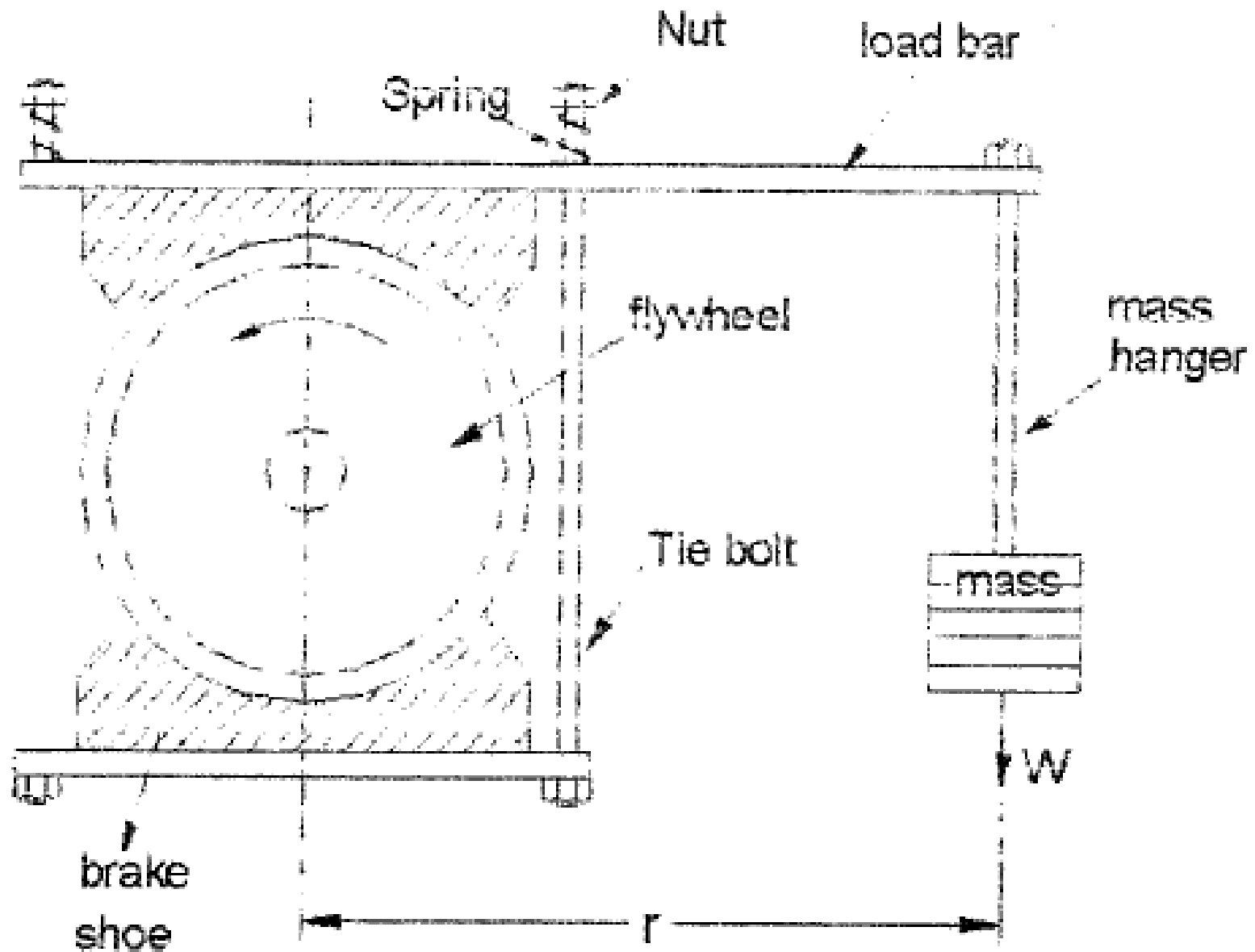
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HOW IT WORKS

It consists of a rope or leather which is wrapped round the flywheel. To one end of the rope is attached a spring balance which is also attached to the ground. To the other end of the rope is attached a mass carrier. This mass carrier is allowed to hang freely although its bottom end is usually connected to the ground by means of a safety chain. Note the spring balance is always on the side of the flywheel such that, when rotating, the flywheel turns towards the balance. The mass carrier is always on the other side of the flywheel such that the flywheel tends to lift the carrier.



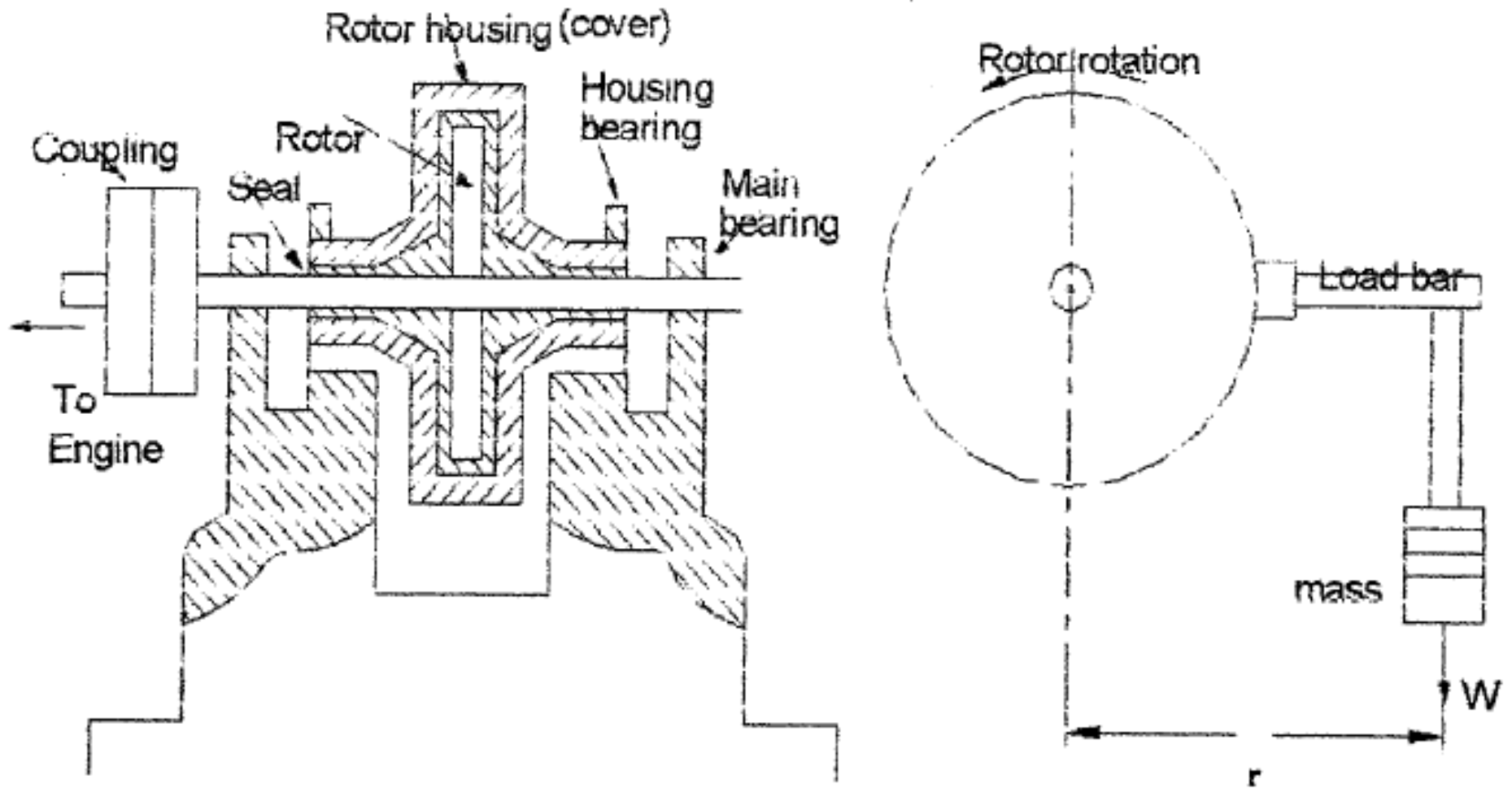
PRONY BRAKE DYNAMOMETER





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Hydraulic dynamometer





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WORKING PRINCIPLE

The principle of operation is as follows. The space between the rotor and the cover is filled with water. If the rotor is rotated, a reaction will be set up with water and cover, with the result that the cover will tend to rotation is prevented by hanging suitable masses on the mass hanger.

Thus a torque reaction is set up and this torque, which is the torque generated by the engine, can be measured.

If M = mass on the hanger, kg

r = distance from centre of dynamometer to hanger,

T = torque developed by the engine, Nm

then, $T = 9.81 Mr (l$



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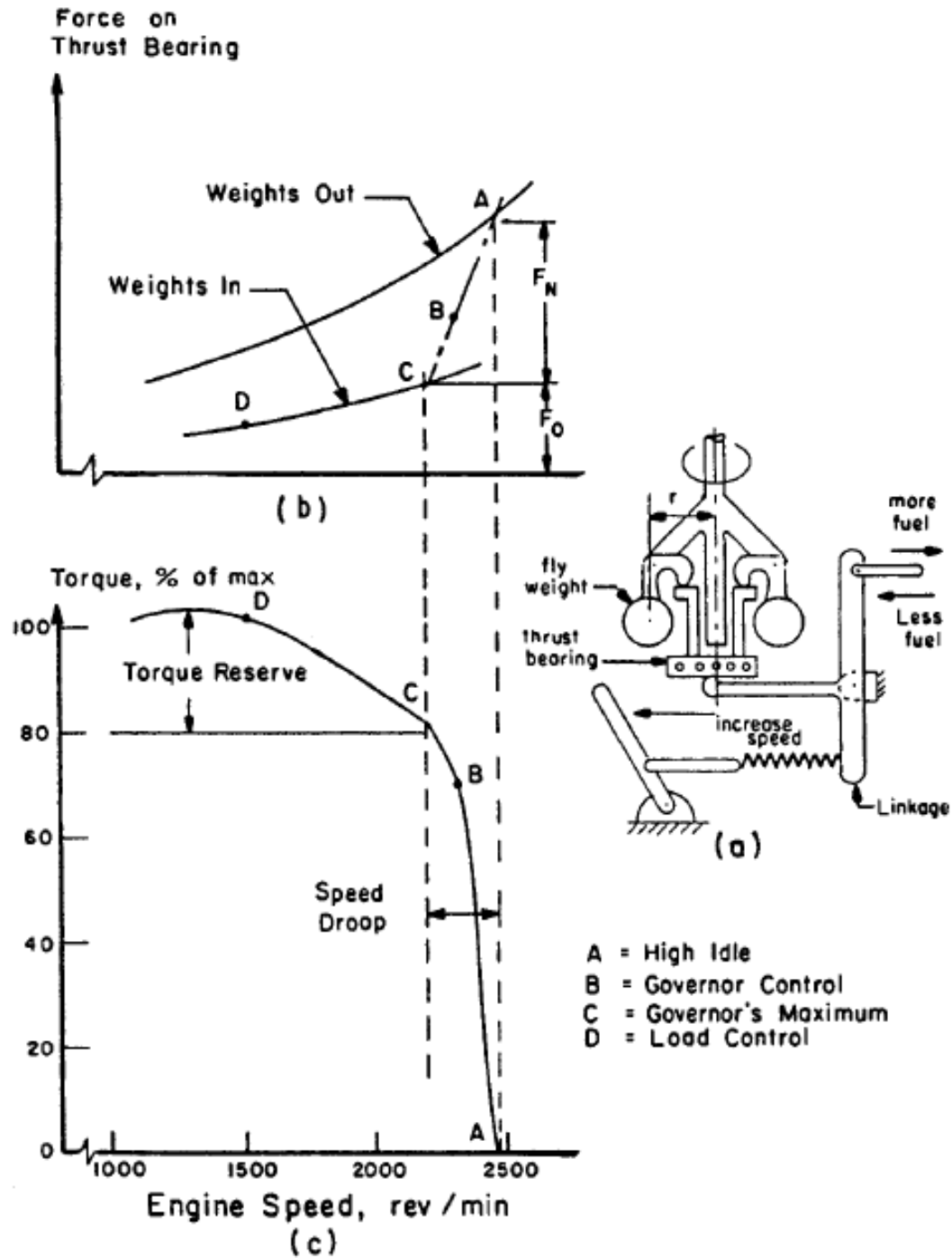


Figure 5.7. Action of an engine governor.



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Torque-speed and power-speed curves for a governed engine.

