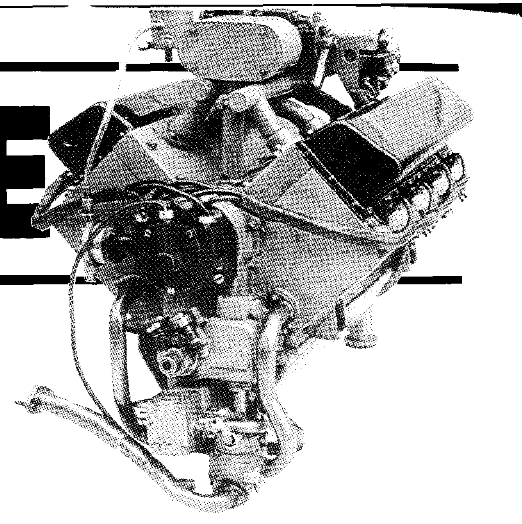
# V8 ENGINE



**Roy Amsbury describes and details the building of a 12Occ V8 i.c. engine which he developed for use with his 5 in. gauge Hymek locomotive. The engine could well have other traction applications** Part VI, *from page 267*

*Having dealt with the building of such items as the cylinder heads, and the various pumps, the Author now turns to some of the vital bolt-on accessories needed to complete this engine*

## Covers and Manifolds

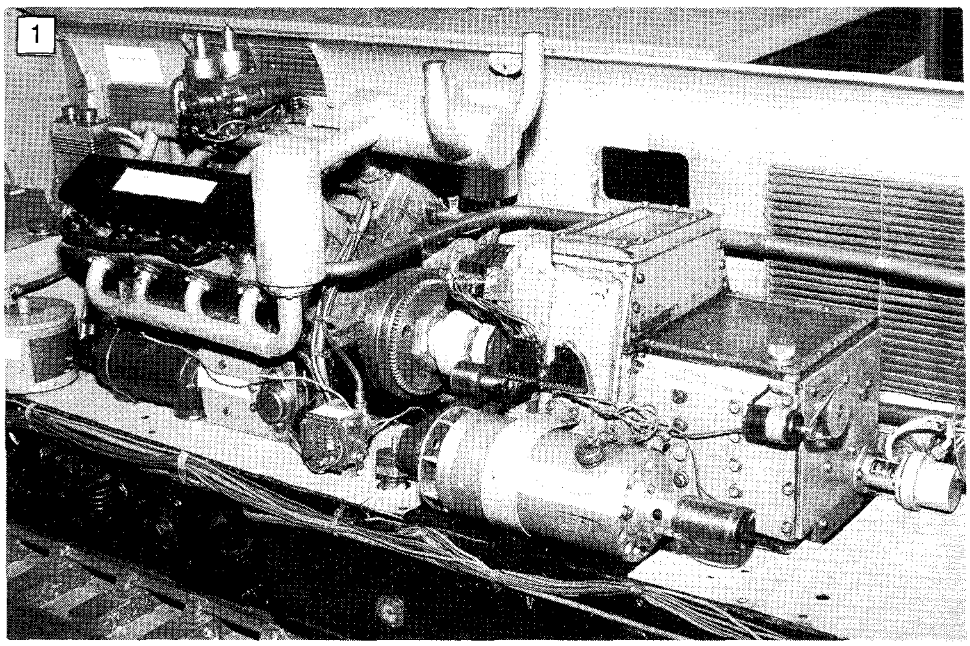
Push rod cover plates are fabricated out of 16swg steel sheet with the various stiffening plates riveted on with 1/16in. iron rivets. The bolt holes in the crankcase and cylinder head are again located from the cover plate. ensure that the head gaskets are in place to give the correct spacing for the bolt holes. The inlet manifolds pull up on to these covers. the inlet ports projecting through the covers and seal into the manifolds by means of "0" rings in the bolting flange.

The inlet manifolds are fabricated from 3/8in. OD thin wall copper tube. the centre distances of the individual feeds are important as the flanges will not seat properly if the pipes do not match up. A small pipe bender such as have been described in M.E. occasionally is a great help in accurately bending such pipes.

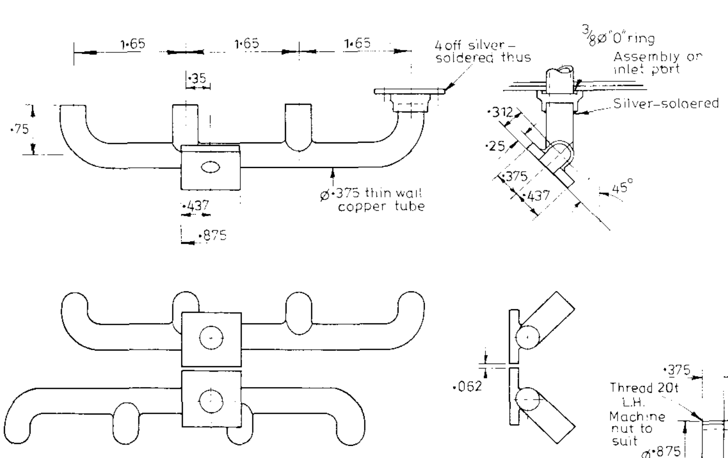
## Carburettor

I have tried three designs of carburettor on this engine and the S.U. type shown is the most successful. A barrel throttle is used as it is easier to make than a butterfly and can easily be trimmed to give a fairly uniform variation of speed with throttle angle. which I required to be able to fit a governor control.

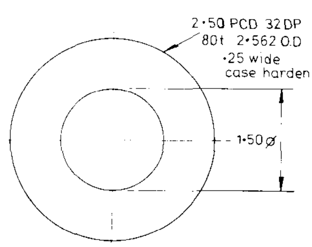
The carburettor body is made from a solid block of brass. most of the machining is fairly straight forward. The accurate parts are the variable choke plungers and their bores. It is important that the various bores



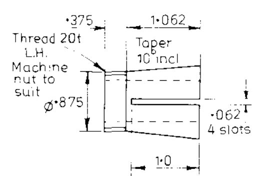
**1: An overall view of the engine in the chassis of the locomotive, showing the completed manifolds and exhaust system.**



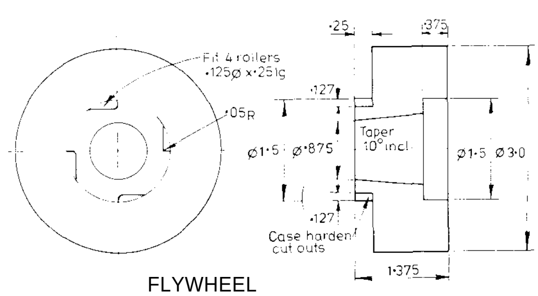

INLET MANIFOLDS
**1 off each -opposite hands**
**Item 56**



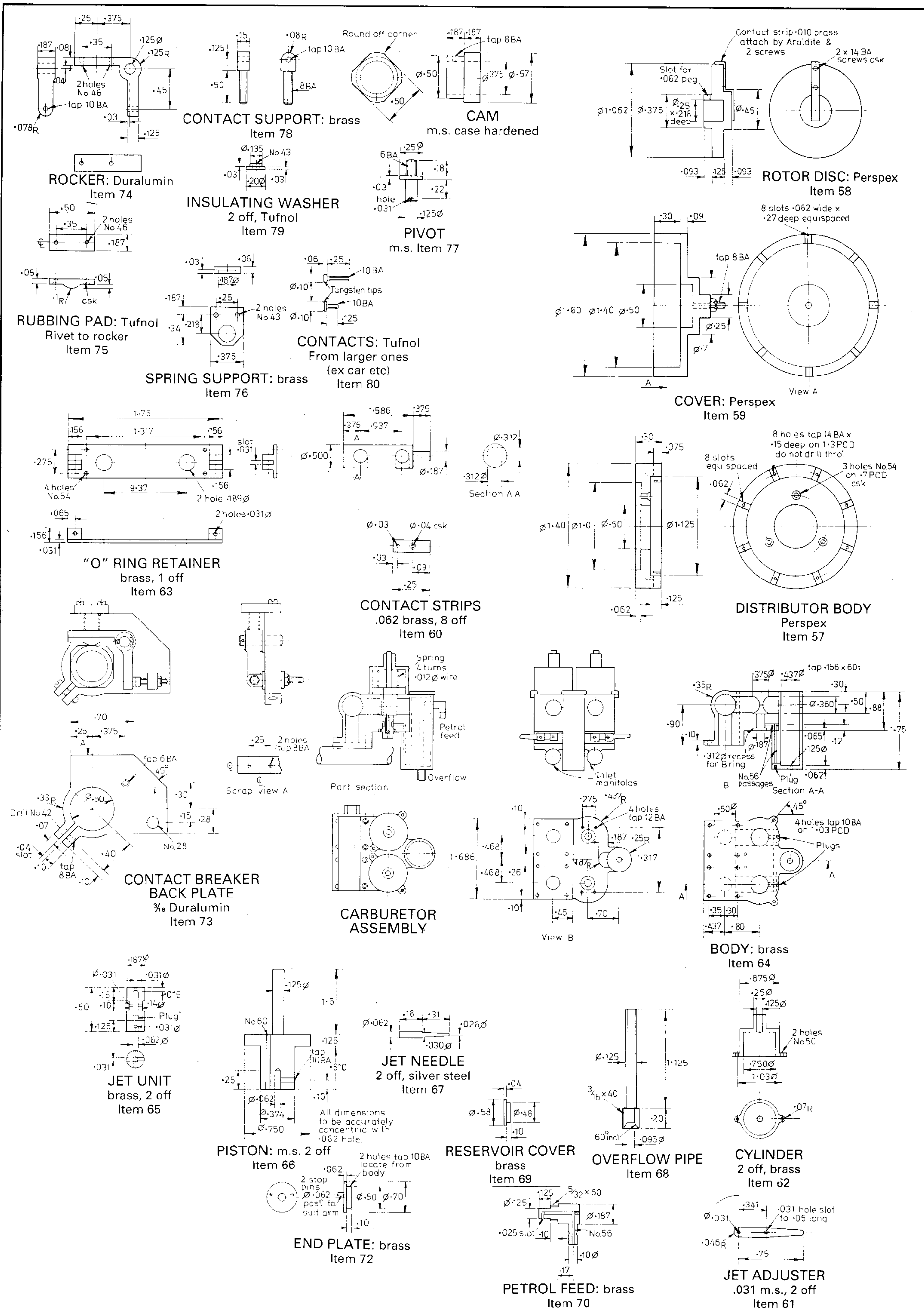

STARTERGEAR
Item 83

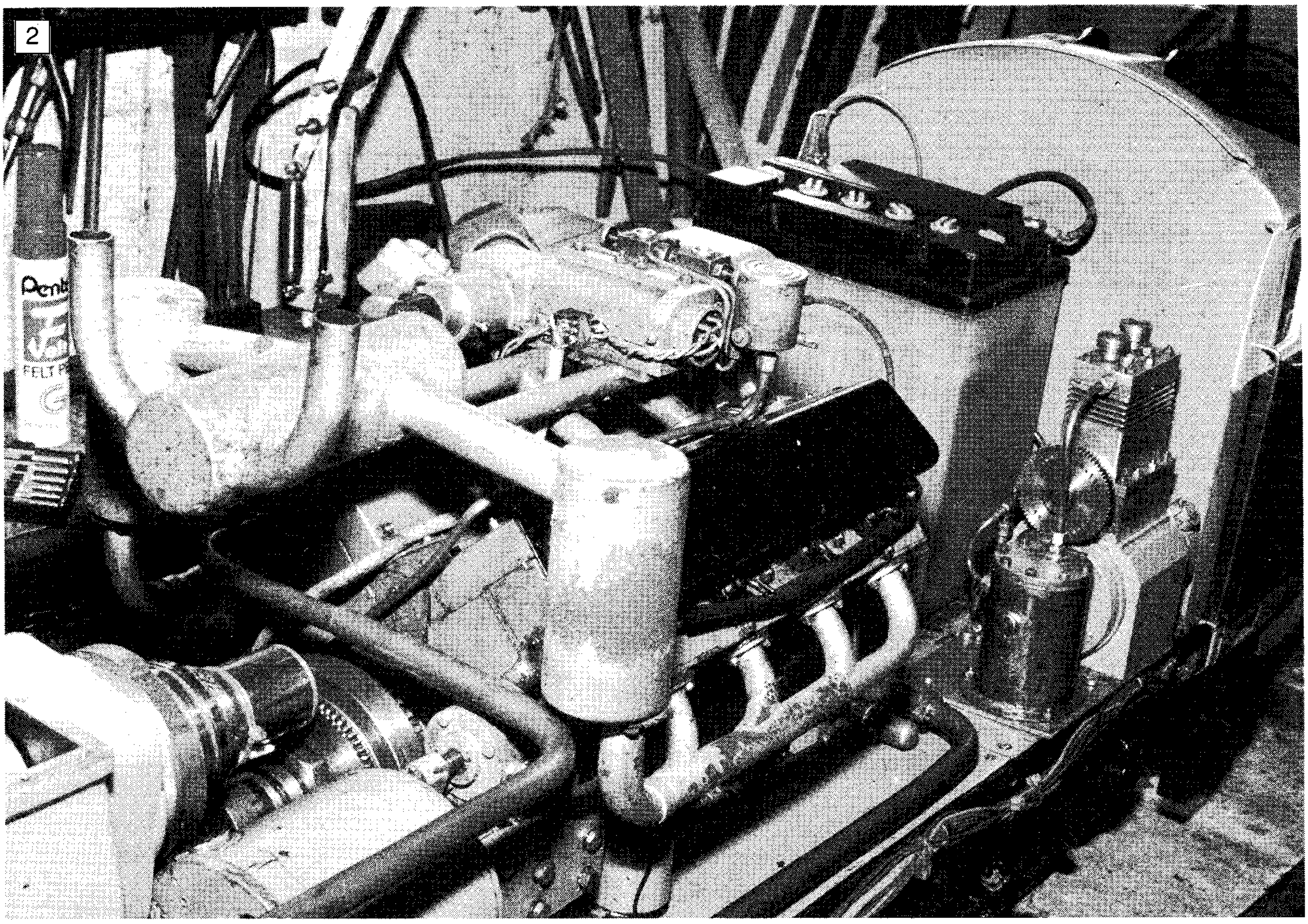



COLLET
**m.s. Item 82**




FLYWHEEL
**ms. Item 81**


ROCKER: Duralumin
Item 74
CONTACT SUPPORT: brass
Item 78
Round off corner
CAM
m.s. case hardened
Contact strip ·010 brass attach by Araldite & 2 screws
2 x 14 BA screws csk
Slot for ·062 peg
ROTOR DISC: Perspex
Item 58
INSULATING WASHER
2 off, Tufnol
Item 79
PIVOT
m.s. Item 77
8 slots ·062 wide x ·27 deep equispaced
RUBBING PAD: Tufnol
Rivet to rocker
Item 75
Tungsten tips
CONTACTS: Tufnol
From larger ones
(ex car etc)
Item 80
SPRING SUPPORT: brass
Item 76
View A
COVER: Perspex
Item 59
"O" RING RETAINER
brass, 1 off
Item 63
Section A A
8 holes tap 14 BA x ·15 deep on 1·3 PCD do not drill thro'
8 slots equispaced
3 holes No 54 on ·7 PCD csk
CONTACT STRIPS
.062 brass, 8 off
Item 60
DISTRIBUTOR BODY
Perspex
Item 57
Spring 4 turns ·012ø wire
Petrol feed
Overflow
Part section
Scrap view A
Inlet manifolds
·312ø recess for B ring
No.56 passages
Plug
Section A-A
CONTACT BREAKER
BACK PLATE
3/16 Duralumin
Item 73
CARBURETOR
ASSEMBLY
View B
4 holes tap 12 BA
4 holes tap 10BA on 1·03 PCD
Plugs
BODY: brass
Item 64
JET UNIT
brass, 2 off
Item 65
All dimensions to be accurately concentric with ·062 hole
PISTON: m.s. 2 off
Item 66
JET NEEDLE
2 off, silver steel
Item 67
RESERVOIR COVER
brass
Item 69
OVERFLOW PIPE
Item 68
2 holes No 50
CYLINDER
2 off, brass
Item 62
2 holes tap 10BA locate from body
2 stop pins ø·062 posn to suit arm
END PLATE: brass
Item 72
PETROL FEED: brass
Item 70
·031 hole slot to ·05 long
JET ADJUSTER
.031 m.s., 2 off
Item 61



***2: A close-up of the fiendishly complex plumbing arrangements.***

are concentric and all should be finished with a small boring tool. However, this is a bit impractical on the 0.062 in. dia. holes for the needles and small drills are notorious for wandering off. I think the best way round this is to hold the blank in the four jaw chuck and drill the 0.062 in hole first. Fit a peg in it of the same material as is to be used for the needle and now reset the four jaw to get this peg to run true, then the remainder of the piston can be finished off.

The overflow chamber is quite deep – the reason for this is that with a shallow one considerable turbulence is set up from the pump feed and occasionally an air bubble will go down the feed to the jets, thus mysteriously stopping the engine – for it immediately re-starts when turned over.

This deep chamber makes the passages a bit complicated, but not too difficult to drill and plug in the brass body. No spigot has been provided to locate the cylinder for the choke piston as I found it simpler to provide a little clearance around the screws, lightly clamp the cylinder down and gently tap it in different directions until the piston runs freely. It must fall under its own weight. on the other hand the piston must have minimum clearance – not more than 0.002 in. on dia.

The jet unit must again be truly concentric and the jet hole must be drilled and O.D. turned at the same setting. The rod is then parted off and drilled up from the other end to 0.062 in. dia. and the slot for the operating lever cut. The 0.062 in. hole is then plugged for about 0.1 in. up.

## Distributor

This can be machined readily from three blocks of Perspex. If you cannot get a thick enough piece a few thinner plates may be joined together using Perspex cement or Superglue. When, turning and drilling Perspex the tools should be ground as for brass, i.e. no top rake – particularly drills which will grab and split the job otherwise. The distributor has been designed to have a minimum clearance of 3/8in. between earthed metal and adjacent electrodes. To this end the blind holes shown on the drawing must be blind. A small gap up to 0.020 in. is permissible between the centre input electrode and the rotor connection – most engines run better with a small gap in the H.T. lead somewhere. If you are worried about electrical interference from the ignition a small resistor (radio type) can be put in the H.T. lead anywhere, its value needs to be between about 1000 and 5000R ~ the higher value may reduce the spark current too much, it depends on the ignition coil used. I have been using a small ex-motorbike ignition coil quite successfully. The ignition leads should be soldered to the contacts before they are screwed in place otherwise the soldering heat will distort the Perspex badly. Ordinary PVC covered wire about 0.08 in - 0.1 in. OD is adequate for these leads, PTFE insulated wire can be used if available and the diameter can be somewhat thinner. A neater job can be made if the leads are finally grouped together through a length of heat shrinkable tubing.

## Contact Breaker

The back plate can be made from a piece of 3/16in. Duralumin or similar material 1-1/4 in. x 1-1/8 in. The rocking arm should be a good fit on the pivot and the contacts square to one another. These contacts can be made by silver soldering the contact tips from a car type contact breaker on to a suitable screw and machining to size. Quite a stiff spring is needed to close the contacts as the breaker has to operate at quite a high speed – up to 400 times per second or more. The other items are simple turning or filing jobs.

## Flywheel

The flywheel is mounted on a tapered collet and I have shown a gear mounted via a roller clutch to enable an electric starter to be used. If you are going to use this system note that the collet has a left hand thread otherwise the nut tends to unscrew.

*To be continued*