

A3/4in. Bore x 5/8in. Stroke Vertical Engine

BY J. H. Jepson

THE following design is offered in the hope that it may prove worthy of the experienced model engineer, while being quite easy to make by newcomers, provided that they have acquired some mechanical ability, and is specially suggested to any servicemen who have access to a workshop and are looking for something to make.

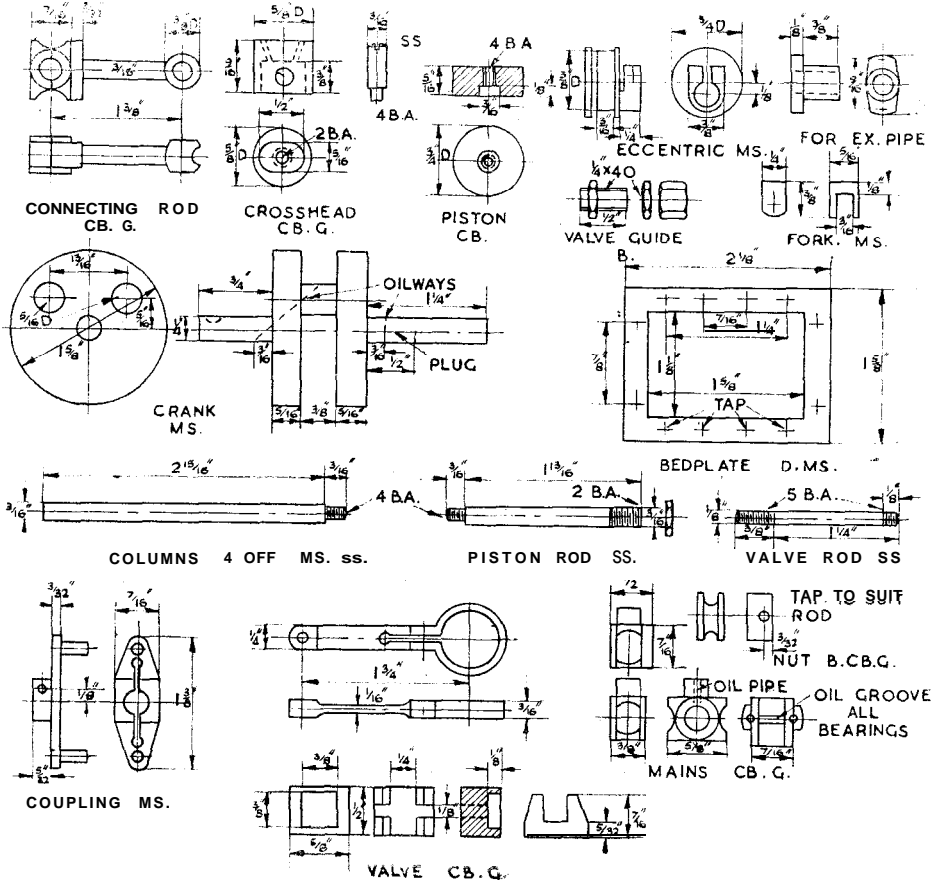
All the materials required are fairly easy to obtain even in these difficult times, no castings being needed.

Model-sized nuts and bolts are in short supply, but can readily be fitted when procurable. Meanwhile, there are plenty of cheese-headed screws about ; but do discard them in due course, they never look as well as bolts and nuts !

around 100-120 lb. pressure, according to hull and propeller design. Suitably supplied with flash steam, another 10 m.p.h. should be added.

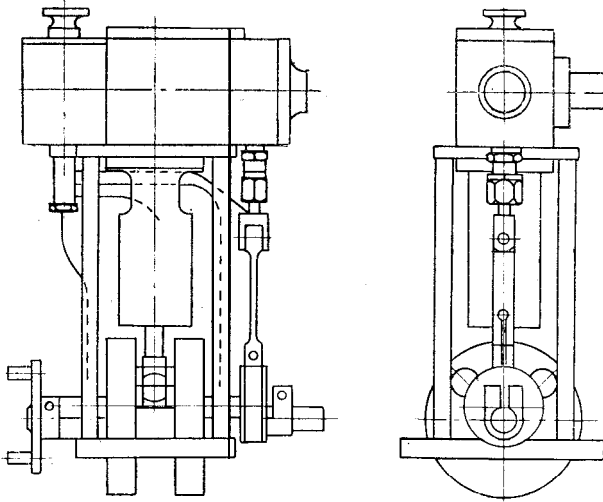
A hull of 36 in. to 40 in. would be most suitable, but the engine would easily drive a larger boat of 4 to 5 ft. long.

On 90-100 lb. pressure, it would be quite capable of towing a rowing-boat at fair speed for those who, like myself, enjoy a bit of novelty. I would add that all the features shown have been well proved by experience ; and for that reason, I ask that the design and dimensions, especially of the cylinder unit, be strictly adhered to. The builder's ability to devise ways and means of making the bits and pieces is taken for granted,

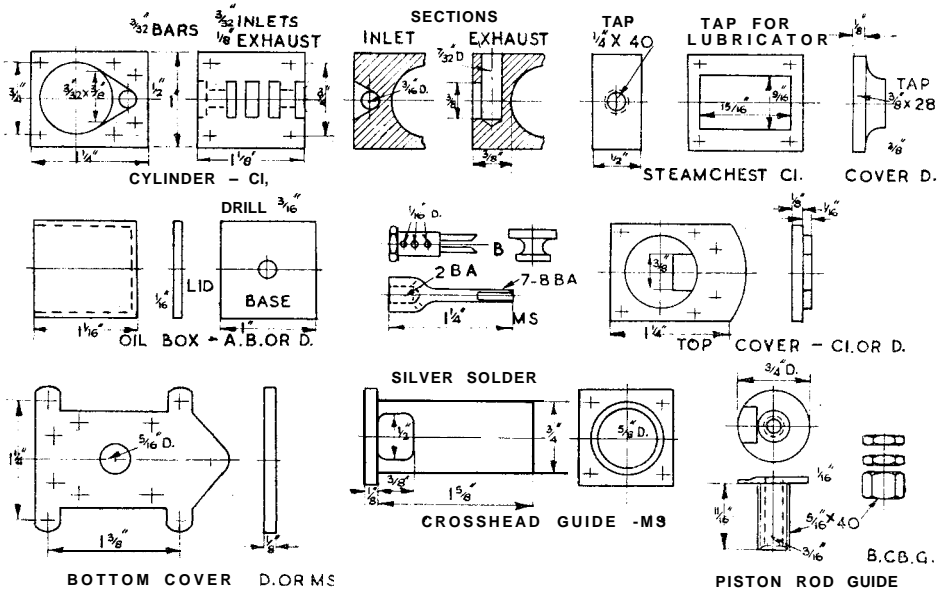


Although being primarily a high-speed boat engine, it would serve equally well as a stationary unit for dynamo driving, pumping, etc. For boat work it should give speeds up to 15 m.p.h. on

so to each by his own way of arriving at the desired end. For that reason there is a minimum of instruction, except where I think a word would be of real help,



- A - ALUMINIUM
- B - BRASS
- CB - CAST BRONZE
- CI - CAST IRON
- D - DURALUMIN
- G - GUNMETAL
- MS - MILD STEEL
- SS - SILVER STEEL



Start with the cylinder-block and see that you get a piece of good cast-iron. In my time, I have cut bits off flat-irons, garden gates, weights, etc.

Be sure to form the recesses shown at each end of the steam passages. Reamer and then lap the bore; you cannot have too good a fit here. Cut the ports as accurately as you can, however you execute the job.

If more convenient, the top cylinder cover could be cut from plate and the spigot fixed by rivet or screw. The steam-chest and cover are straightforward jobs.

The oil-box can be made up from 1-in. square brass tube or end-milled from a block of A.B.D. (see chart), or built up, silver-soldering for preference. For the crosshead-guide use a piece of steel tube, a box spanner may prove useful

here, provided it is true and smooth internally.

To end-mill the crosshead recess, a stub of 5/16-in. twist-drill will suffice, if suitably ground and a high speed is used. Should the crank webs prove too heavy a job for your lathe to part off (mine is a treadle) cut them roughly from mild-steel plate, drill them together, then turn in the lathe using a spigot in the chuck. The main and big-end bearings can be formed by parting off suitable lengths of 5/8-in. diameter C.B., sweating in their pairs, drilling, finally forming on another spigot, unsweating and then reamering. See that the big-end passes down the crosshead guide, as this may assist in general assembly.

The eccentric fixing is very firm and allows of easy valve timing; drill the oil-hole from centre of crankshaft after the eccentric is finally set.

Some patience will be required in cutting the slot so that the screw can pinch up ; a hacksaw blade worked by hand will do the trick.

I have long- since discarded the grub-screw method for securing the eccentric, as being liable to slip, while for flywheel fixing for serious work, it is hopeless.

Here is a brief summary of points for the final assembly : Check the piston for equal clearance each end of the cylinder ; make certain the valve does not touch the steam-chest at either end of its travel, and leave a little rock in the valve-nut to ensure the valve seating properly. Before actually setting the valve, adjust for equal port-opening, then set it for timing, which should be inlet just opening 10-15 degrees before dead-centre. 'Cylinder bore to be true with bottom face especially. likewise the bore of crosshead guide to be true with its flange. Connecting-rod to fit easily into crosshead with no side pressure, the eccentric-strap to swing freely into its fork on the valve-spindle.

Fit a 3/8in. exhaust pipe, as short as convenient, and having no sharp bends. Steam pipe to be 3/16 in., but 1/4 in. if the superheater is good enough to ensure dry steam. To get a nice appearance, temporarily fit together the cylinders, covers, steam-chest and cover, and oil-box ; file and polish them as one unit.

Paint the cylinder block maroon or black, also the steam-chest if of cast-iron, but leave the rest polished.

Case-harden the eccentric sheave and strap, polish only their working surfaces. Polish all other steel parts, heat them to a deep-purple and

drop in oil. Do the same to all nuts and bolts to be used finally. This gives a nice finish and is rust-resisting.-

For whatever purpose the engine is used, see to the alignment be it propeller-shaft or dynamo ; do not waste precious power on mal-alignment. To those who may wish to operate in flash steam, fit two exhaust pipes, keep the steam temperatures reasonable, and use an oil-pump. When built properly this should be a real engine, long-lived and hard-wearing, not intended for ticking over, but in operation allowed to purr or drone.

For really low speed; shorten the valve travel to 3/16 in., the valve cavity to be 5/16 in. long, instead of 3/8 in., thereby giving a total length to the valve of 9/16 in., as against 5/8 in. as shown. In this case the cylinders would be of cast bronze or gunmetal. To take care of the engine, always leave the cylinder filled with oil ; do this by feeding oil via the exhaust pipe and turning the engine backwards. When full the engine should be quite difficult to turn.

Remember this oil when using the engine again (don't say I didn't tell you !). Steam oil will be required in the displacement lubricator and the oil box.

In conclusion, some of these points should prove useful to that large number of users of Stuart-Turner engines, No. 10 and B.B., and can readily be applied to their engines, especially the cylinder assembly.

Through THE MODEL ENGINEER I should be very pleased to hear from any builder of this engine.

" L. B. S. C. "

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and tight threads on the stay-bolts and in the plates, so that they are virtually steam-and-water-tight even without any sweating. The sweating-up should be merely a sort of " safety-first " insurance against a slight leak caused by an undetected torn or damaged thread, also to make certain the lock-nuts on the stays inside the firebox do not come adrift. If our friend mentioned above had fitted his stay-bolts according to " words and music," he would never have had any initial leakage, so his other troubles would have been, as Mike O'Finnegan would say, stopped before they started. At the same time, if he had heated up the whole of the boiler evenly before attempting to silver-solder the crack in the throatplate joint, and then let it cool off very slowly and evenly, along with the coke in the brazing-pan, the repair wouldn't have cracked again, and there would have been no risk of opening up fresh places. The whole and sole trouble of a joint cracking open, is stress set up by unequal heating and cooling. In days gone by, I repaired two or three leaky boilers for my few personal friends, by aid of my "Alda" blowpipe and a spot of "Easyflo"; and in the cases where the stay-heads had been sweated up, also to prevent the re-opening of the leaky place the job was done with the, boiler in a bath of boiling water, and left in it to cool down slowly.

The second query refers to the blue-prints for " Dyak," issued from THE MODEL ENGINEER Publishing Department. Several purchasers, of this set want to know why the boiler is shown with a butt-jointed firebox, contrary to my instructions and illustrations in the " serial " describing the engine ; and one reader who has actually tried to make the firebox with butt joints, has got in trouble with it, and seeks aid to get him out. The firebox should have been shown with flanged joints, as in all my other boilers ; how it was shown otherwise, is a matter that only the tracer can explain. Anybody who has the back numbers of this journal, dealing with the construction of the boiler, can verify that flanged joints were specified, and illustrated in my own original drawings. However, butt joints between the firebox sides and crown sheet, and the end plates, are quite all right in the smaller sizes, as long as they are well brazed and have a good fillet of brazing material left all around. The said brazing material should be a good grade of strip or spelter, so that there is no chance of it melting when the tubes are silver-soldered in. The last gauge " O " boiler that I made-and if I know anything about it, quite definitely the last, as I hate " watchmaking "-- had a butt-jointed firebox, the joints being made with No. 1 Sifbronze, and has given perfect satisfaction.