5 Some Practical Notes

5.1 Introduction

Experience has shown that it is unwise to make dogmatic statements concerning Gauge 0 steam engines. I have read many times that this or that cannot be done but with a different approach I have often found an answer. I don't doubt that in turn some of my pet theories have been confounded by other modellers. However, the following remarks are drawn from my own experience and may be of interest and help.

5.2 Boilers

A large boiler will not necessarily produce more steam than a smaller one; the output depends on the amount of heat applied. However, a larger boiler will be more stable and will not react so quickly to any change of conditions.

Over the years, designs for steam locomotives have appeared in the model press and some builders have produced very good working models. Others have not been so fortunate and their models have been shelved and not finished off due to disappointing performance. In the majority of cases this was entirely due to bad steaming.

In my own work I have had my share of steaming problems and nothing can be more frustrating; the spirit supply might be working properly, the steam raising fan might get the water boiling quickly and the engine's blower might soon have the safety valves blowing off. Yet, when the regulator is opened, the engine runs a little way and then expires with no steam. While mechanical faults can usually be identified by observation, checking, looking for leaks etc., poor steaming, when everything appears to be in order, can be baffling. I fear that several modellers have concluded that Gauge 0 is too small for steam and have given up at this stage. What can be done? There are no hard and fast rules or formulae, but the following routine will often provide the cure.

First, one should check the obvious things: an adequate spirit supply to the burner; that the wicks are in order and not packed too tightly in the burner so that a good clear bluish flame is produced; and that the tubes or flue, according to the type of boiler, are clear.

Having cleared these points it is highly likely that the trouble lies in the smokebox. The smokebox must be airtight. In the past it has been said that spirit firing does not require so much draught as coal firing; this is quite wrong. Spirit firing needs as much draught as it can get. Ensure that the smokebox door closes tightly. If there is any doubt, a smear of black paint round the joint before closing will help.

Check the joint at the rear of the smokebox where it joins the boiler barrel to ensure that there is no air ingress and also check the holes for the blast pipe and steam pipe. (see Fig 5-1) If there is a union joint in the steam pipe, check that there is no steam leakage as this could spoil the draught.

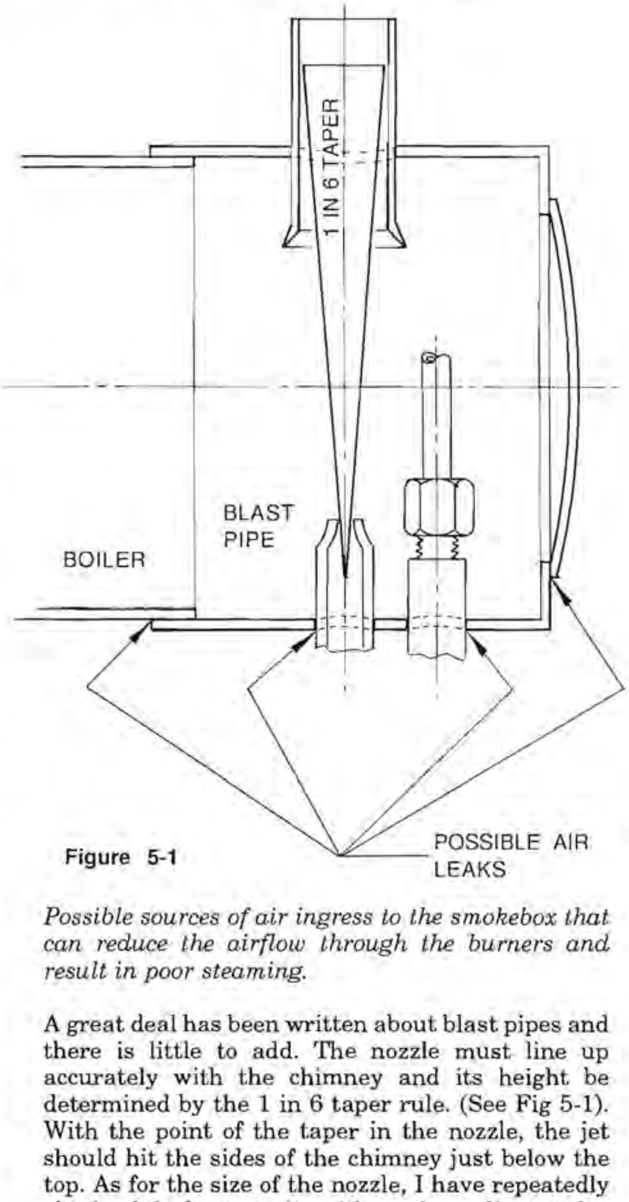

Figure 5-1

Possible sources of air ingress to the smokebox that can reduce the airflow through the burners and result in poor steaming.

A great deal has been written about blast pipes and there is little to add. The nozzle must line up accurately with the chimney and its height be determined by the 1 in 6 taper rule. (See Fig 5-1). With the point of the taper in the nozzle, the jet should hit the sides of the chimney just below the top. As for the size of the nozzle, I have repeatedly obtained the best results with much smaller nozzles than usually recommended. In my largest engine, a Pacific, it is 3/64" dia. while in my smallest, a tram engine, it is a No 70 drilling; the other engines range between these sizes. The optimum size is usually found by trial and error. Sometimes an engine will steam well from the beginning but, if it does not, the smaller nozzles are tried progressively, usually one drill size at a time, and hopefully the correct size will soon be found.

If this reduction is carried too far it will 'strangle' the engine exhaust. This is soon apparent as the engine has no speed, the exhaust sounds feeble and any further opening of the regulator produces more noise but no more speed or power.

I have noted that if a locomotive is built to scale, with its firebox the scale size of the prototype, then the burner that can be accommodated in it will normally provide sufficient heat to give a good performance.

5.3 Cylinders

In Gauge 0, cylinder dimensions are usually dictated by the physical limitations and, if a scale appearance is desired, a bore of 3/8" is about the maximum possible for outside cylinders. With inside cylinders, 5/16" or 11/32" is about the largest that can be accommodated with normal frame spacing and thickness.

It might be thought that large cylinders are essential for high power. This is not so, as power is produced from the steam generated by the boiler. With a good supply of steam, the amount of power produced by very small cylinders can be amazing. Two engines that I have completed recently have inside cylinders of 9/32" bore and 1/2" stroke and both will haul a 12 coach train at high speed with the regulator just open. My little Wisbech and Upwell tram engine, has cylinders 1/4" bore and 11/32" stroke. In its early days, before wear, tear and regular overloading took its toll, it would run slowly and continuously with 12 bogies. This shows that cylinder dimensions are not so important as a good boiler. However, I should mention that these small cylinders were the largest that could be fitted on the respective engines. I always make them as large as can be accommodated as small cylindered engines tend to lose power quickly if the boiler pressure falls or priming (water carried over from the boiler) occurs.

When designing valves and ports it should be noted that the valve does not need to fully uncover the steam ports since a great deal of high pressure steam will pass through a very small opening. However, the exhaust is a different matter and things should be arranged to ensure that the port is fully open and does not restrict the flow of low pressure steam. This is important for free running, but provided that the valve has a lap of about 1/32" it will normally take care of itself. The exhaust passage to the blastpipe nozzle should be generous throughout - at least 3/32" bore. Try to avoid sharp and right angle joints, although I am not sure that this has much effect in this small size.

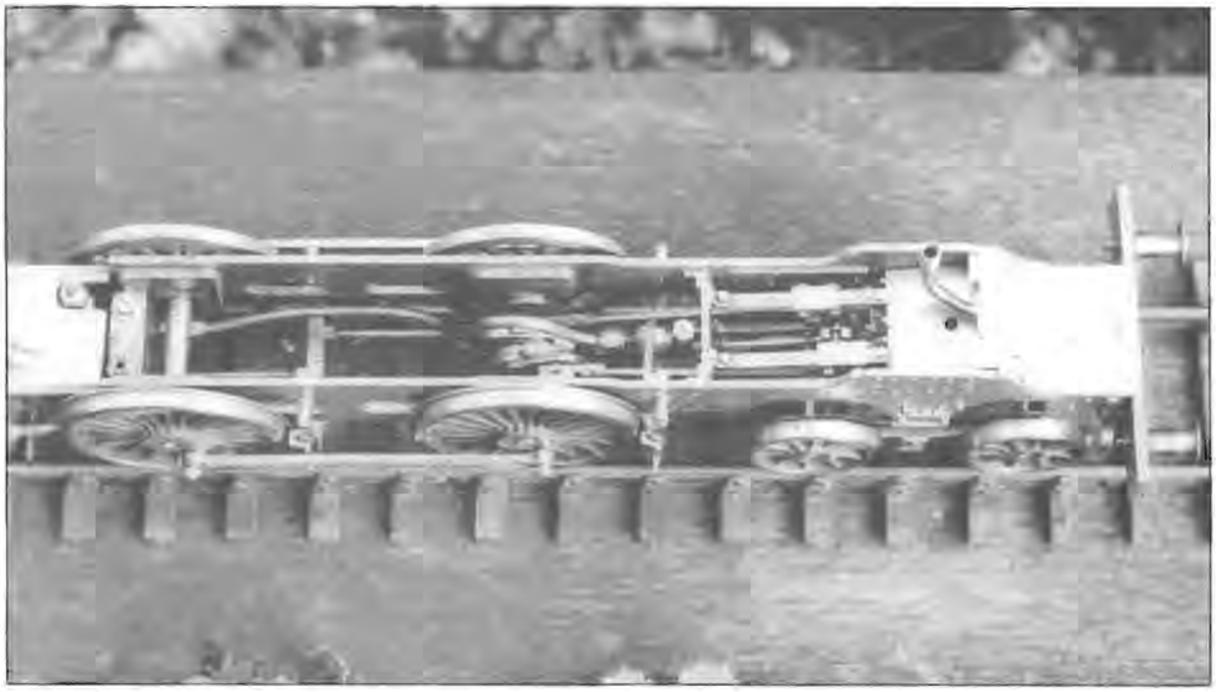

Photo 5.1 Chassis for a North Staffordshire Railway 4-4-0 showing a crosshead driven feed pump just behind the motion plate. (Photo T. Hughes).

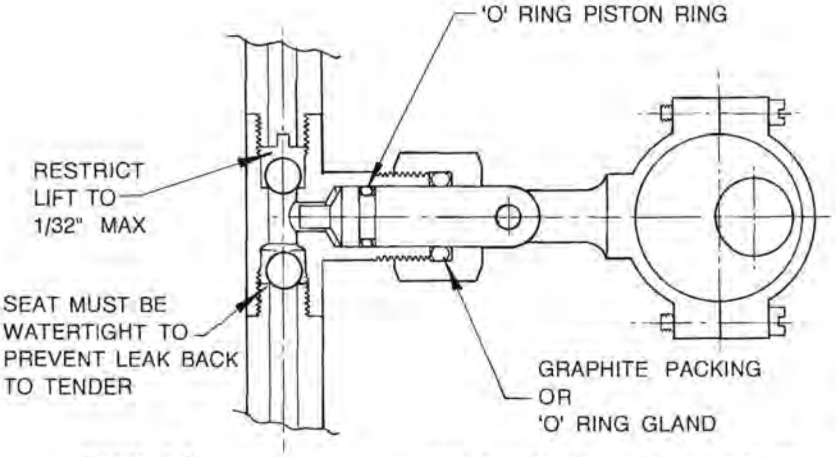

Figure 5-2

TYPICAL DESIGN OF AXLE DRIVEN FEED PUMP

Typical design for an axle driven feed pump with restricted lift to the valves.

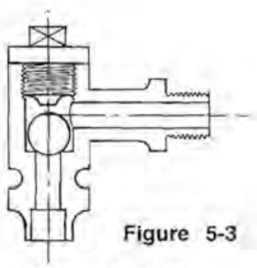

Figure 5-3

BOILER FEED NON RETURN OR 'CLACK' VALVE

An example of a boiler feed non-return or 'clack' valve.

5.4 Mechanical Feed Pumps

These can be a source of frustration: some always work well, some will not work at all and others - the worst of all - work well at the start and then fade out halfway through the run. A typical design is shown in Fig 5-2. Construction points to watch are:

a) The valves must seat properly, especially the bottom, inlet valve, and the lift of the valves, (usually a rustless ball) must be restricted to no more than 1/32". In Gauge 0 these balls will be 1/16", 3/32" or 1/8" dia and, having little weight, they do not drop onto their seats as readily as the larger balls used in, say, 5"gauge locomotives.

b) The ram must be properly sealed; for this 'O' rings, either on the ram or the gland, are much superior to the old packed glands.

c) The feed pipe from the tender or tank must have no leaks as the smallest amount of air entering the system can cause failure.

d) The boiler feed clack valve (see Fig 5-3) should not leak. Hot water getting back to the feed pump will heat it up and prevent it working properly.

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