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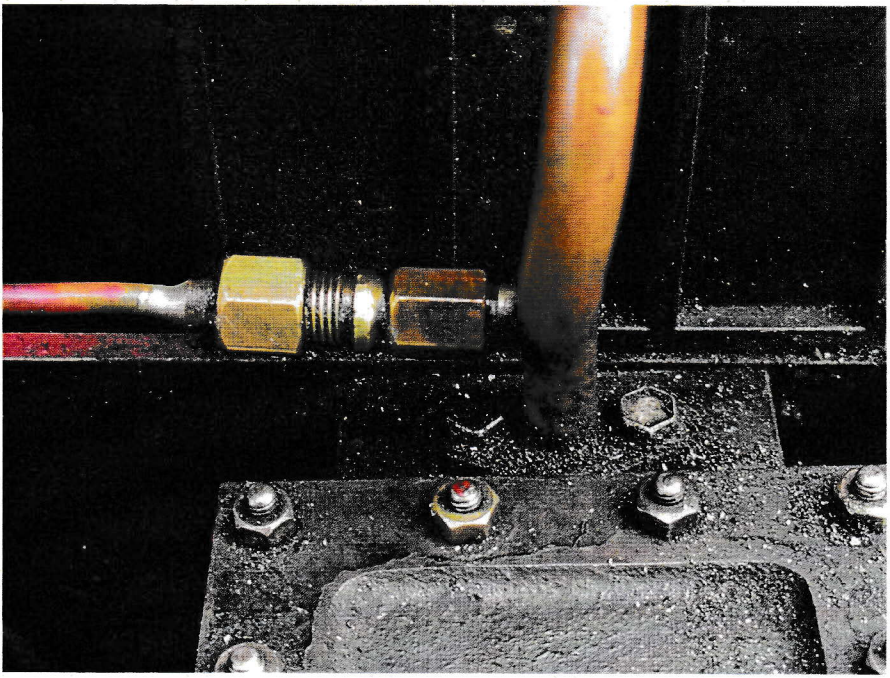


Oil Non Return Check Valves (Picture page 8)

I have lost count of the number of times that I have heard locomotive owners complaining that their lubricators have filled up with water with the result that the steam oil is all over the locomotive. The usual reason for this is that the non return valve in the steam line is not seating properly and letting steam flow back into the lubricator reservoir. The problem occurred on my first locomotive [back in the 1980,s] and despite all efforts to correct it the problem continued to be a nuisance. Sweet Pea suffered very badly from the problem when I first became the locomotives custodian.

Fortunately, there is an easy solution, which is to insert a car tyre valve into the oil line to act as the non return valve. Nearly all garages fit new tyre valves when they fit a new tyre onto your car. If you ask for some of them they usually will give you a dozen or so from the scrap bucket. Start by cutting of all traces of rubber from the valve stem, and finish off with a wire brush. Remove the inner valve core from the stem, and only keep the short type valve cores for future use. The valve stem can now be shortened and a threaded extension silver soldered onto the end. It will be useful to make the threaded piece from hexagon material so that you have spanner flats when you come to tighten the gland nuts when fitting the valve into the pipe run. The thread is 5/16" x 32 tpi. Lightly countersink both ends to form a seating for an olive and a nut to connect an oil pipe onto the valve stem. Make sure that the hole through the pipe olive is large enough to allow the small pin on the valve core to enter the pipe if needed or the valve will leak back as before. Now refit the short type valve core back into the stem and fit the assembly into the steam line, being careful to get it the right way round.

I have <u>never</u> had one of these valves leak back water into the oil tank and I now fit large oil tanks on my locomotives with confidence. Industry uses these valves in hydraulic oil accumulators at pressures up to 2500 psi. So we are only tickling their capabilities at 100 psi on our locomotives. If any dirt finds its way into the valve core and it lets water back into your tank, throw it away and fit another one from scrap. Then check your oil tank for cleanliness as any dirt has been introduced by you from your oil can. Lastly, if any one wishes to see an example of these valves you need look no further than Sweet Pea where there are two fitted on the oil pipes, or we can have a chat on a Friday night.

I hope this helps someone.

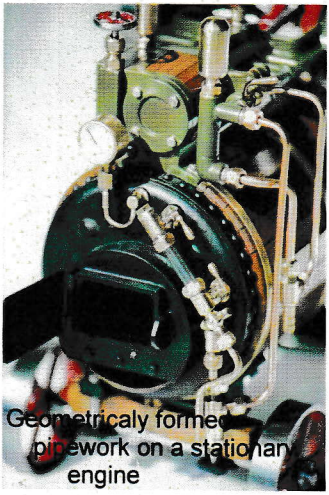
Geoff King

Jottings from the Workshop by "Artisan"

Pipes and Pipe Work

The powers that be (whoever they may be) have recently expressed concern about the lack of articles of a technical nature appearing in LINK. For some reason which is not entirely clear to me I was asked if I could contribute anything of interest. I recalled that soon after Graham took over as editor it was suggested that he start a "Letters to the Editor" feature and an attempt was made to start the ball rolling with such a letter (see LINK number 29 – July 2008). This was not only the first contribution to the new feature; it is also the last to date! One way to stimulate correspondence is to provide some controversial comment or idea which people feel strongly about, either disagreeing or feeling they have a better idea. All good magazines have a regular feature so I decided to stick my head above the parapet and offer to write such a feature with articles describing some of my own ideas and workshop techniques. Hopefully these notes will be helpful to newcomers to model engineering whilst at the same time providing old hands with the opportunity to write to the editor to tell me where I am going wrong and provide more and better ideas on "how to". There is a great wealth of knowledge and experience in the Club and my hope is that members can be prompted into sharing this know how with us. It is often easier to react to someone else's comments than to initiate a subject from scratch.

To conclude these opening remarks it must be said that none of the ideas or procedures that I or anyone else describe should be considered exclusive. There is invariably more than one way of killing the cat and whilst there may be methods or techniques that it would be unwise to attempt (like climb milling, for example) there are usually several viable methods of tackling any job, depending on the facilities available and the ability of the individual concerned. Any suggestions or procedures I describe will be based on my own experience and what works for me. Hopefully any contribution by others will be offered in the same vein.

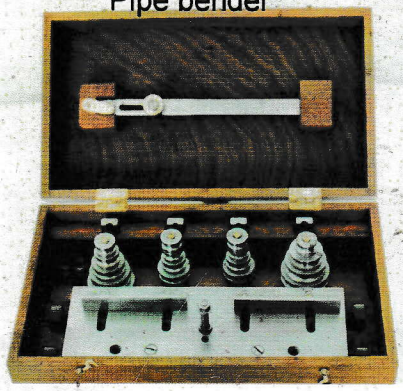


Geometricaly formed pipework on a stationary engine

So much for the preamble! Now let's get down to business. I have chosen "Pipes and Pipe Work" as the subject of this first dissertation. Not very exciting, you may say, but it is a subject about which I have a "bee in my bonnet" (yes – another one!). I have seen many models spoiled by untidy or ill formed pipe work. It can, of course, be argued that so long as a pipe starts and finishes in the correct place and is of a suitable bore it

fulfils its intended function whether it looks pretty or not. If the application is required to be purely functional this argument is credible. If our model is intended to reflect full size practice however, whether scale or freelance, it must be recognised that full size engine builders took a pride in the appearance of their creations. Whether the engine is a stationery engine, a locomotive, steam or internal combustion a full size example would have carefully formed pipes arranged in a tidy and orderly formation and properly supported. There is no reason why our models should not have the same attention given to this feature. My personal objective is always for pipes to be formed into neat geometric formations with properly formed bends and straight runs that are, in fact, straight. All too often bends are of variable radius and straight runs are in fact "wobbly".

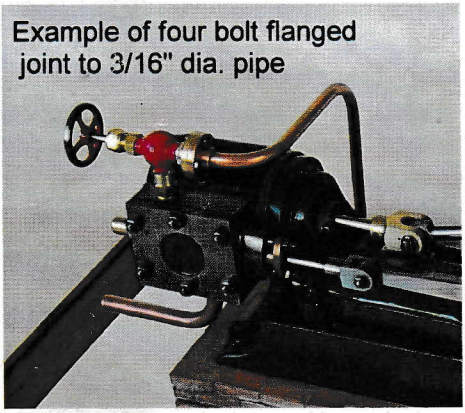
Pipe bender



It is very difficult to achieve such result by "freehand" bending, particularly where tight bends are concerned and with large diameter pipes. Unless something is done to prevent it doing so the pipe will tend to collapse as it is bent due to the need to stretch the wall on the outside of the bend and compress the wall on the inside. The smaller the radius of the bend the worse the situation, with a kink forming instead of a bend if too tight a radius is attempted. The classic way of preventing this is to fill the pipe before bending using sand or a low melting point alloy which can be easily removed when forming is complete. The alloy known as Woods Metal melts at a temperature of less than 100 deg. C and can be removed from the pipe by immersion in boiling water Another technique often used on larger pipes is to insert a pipe bending spring. For very small pipes the spring may be fitted outside the pipe. Personally I have never had much success with filling pipes and if a spring is used the need to control the shape of the bend calls for some mechanical aid if accurate formation is to be achieved. Furthermore the minimum radius of the bend is limited by the need to be able to remove the spring after forming. The technique works fine for plumbing the central heating system but leaves much to be desired for

Pipe bending in progress

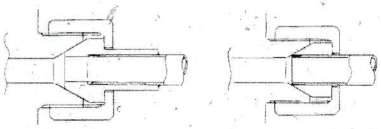
model plumbing requirements. The technique which I use is to employ a purpose made pipe bender as shown in the photographs. The bender employs formers for each size of pipe and for each bend radius. The formers consist of a disc with a semicircular groove in the edge of diameter equal to the pipe diameter. The pipe is pulled round the former using a plate with a similar groove formed along one face. The pipe is trapped between the former and plate such that at the point of contact with the former the pipe is constrained in a circular cavity and cannot distort into an oval shape. The result is that a bend radius of as small as two pipe diameters can be produced without any ovality developing. The picture shows a 3/16" diameter pipe being pulled round a 3/8" radius former, the radius being defined at the centre line of the pipe. My own bender is based on a design published in Model Engineer magazine many years ago and is provided with formers for pipes up to ¼" diameter. There are, of course, numerous proprietary pipe benders on the market but these do not generally have the versatility of the device I have described. It will be appreciated that I am talking generally about copper pipe. The same comments apply to steel pipe except that much greater force is required to pull the pipe round the former and the minimum bend radius attempted needs to be a little larger than might be used with copper, particularly for the larger diameter pipes. I always try to manipulate copper pipe in the "as drawn" condition. In this state the pipe usually starts off straight and free of any local irregularities. Bending is no problem with the material in this condition and the resulting formed pipe will be far more rigid than if it were annealed before bending. It will also be less likely to suffer damage or distortion due to the odd knock in service. Before leaving the subject of pipe manipulation the question of how to position the various bends in order to achieve the correct route arises. My own technique is to make a template by manually manipulate a piece of soft iron wire of about 16 gauge into the shape required. If a bend is formed in the wrong position the wire is easily straightened out ready for another attempt. All that is required is to ensure that the bends are formed to the same radius as those proposed for the pipe. The wire template can then be used as a guide for forming the pipe. A little time spent getting the template right and in following it accurately is well worth while. If a bend is formed in the wrong place in the actual pipe it is almost impossible to rectify without producing unsightly kinks or irregularities



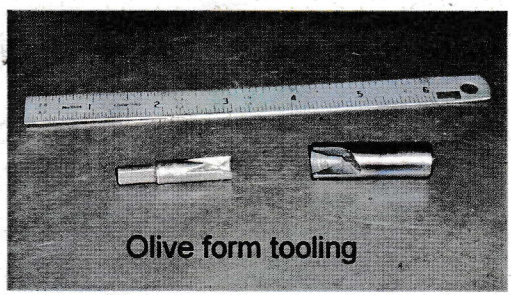
Example of four bolt flanged joint to 3/16" dia. pipe

The joints in the full size pipes, either between individual pipes or between pipes and fittings, are made in a manner appropriate to the size of the pipe, ie small pipes up to

about 1" diameter will usually have screwed unions of some sort whilst larger pipes will have bolted flanged joints. Even the smaller pipes may be fitted with flange joints. All of the pipes on our models are of small size and lend themselves to the use of screwed unions. Whilst this is a very convenient means of making joints it is not always visually correct. A classic example is the pipe connection to the boiler feed clacks on the side of locomotive boilers. It is common practice for this connection to be made using a union nut of about 3/8" A/F on models. I have been unable to find a single example of this form of connection in full size – four bolt flange connections are invariably used. (No doubt there will be a letter to the editor in the next edition of LINK quoting an example of a large union nut in this application!) If you are trying to be prototypical and fit a flange joint remember that flanges invariably have four or multiples of four bolts. It is very rare for six bolts to be used. The majority of connections on our models will, however, be made using conventional unions. The female part of the union is normally formed with a conical seating having a 60 degree internal angle which is easily machined using an ordinary centre drill. The matching end for the pipe may take the form of a union nipple or an olive as shown in the sketch. Personally I never use nipples for my pipe connections. They take up far too much space and require an unnecessarily large union nut. My method of making the olives is one I developed over sixty years ago and I am still using one of the cutters I made then. I described the procedure during a talk I gave at the Club some years ago and it aroused some interest then so I will repeat the details here. The method involves making some simple tooling as shown in the picture. The tool is formed by drilling a deep countersink in the end of a piece of silver steel with a centre drill and milling or filing away a quadrant from one side. The tool is then hardened and tempered in the usual way.



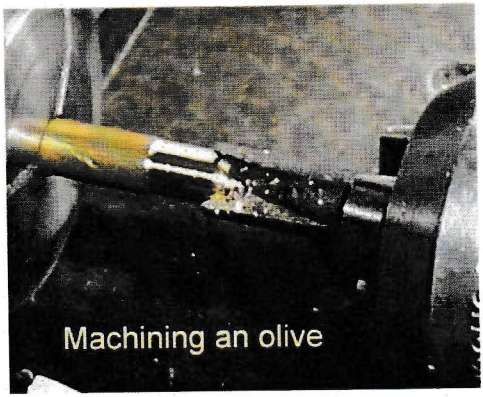
Union with nipple Union with olive

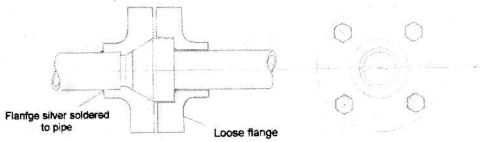


Olive form tooling

A piece of brass bar stock of appropriate size is machined down to a size slightly smaller than the inside diameter of the thread in the union nut and a hole of pipe diameter drilled into the end. The form tool is then held in the tailstock chuck and applied to the end of the bar until a chamfer is formed to leave a knife edge with the bore. The olive is then parted off and the form tool applied to the end of the bar for the next olive.

The process is repeated until the end of the prepared section of bar stock is reached, when the whole process can be repeated until the required quantity of olives has been produced. I usually make a batch of twenty or so at a time and keep a stock of various sizes. Someone will now write to the editor and say that the tool I have described will not work because the cutting edge has no clearance. This is, of course, theoretically correct, but try it – it works! I specified that the chamfer should be machined to knife edge with the bore of the olive. This has the effect of swaging over the end slightly so that when it is applied to the pipe it locates precisely where it is required. If the pipe is trimmed so that the end sits comfortably in the conical seating of the female part of the union the olive will be in exactly the right place when it is silver soldered in place. Don't forget to put the nut on (the right way round) before soldering the olive!! Be very sparing with the silver solder. It must not be allowed to run onto the conical face of the olive and too big a fillet between olive and pipe will prevent the nut seating properly. Having smeared a little Easyflo flux on the joint I use a small flame to bring the olive and end of the pipe to the required temperature (a dull red heat) and just a touch with a piece of 0.8 mm diameter silver solder wire at the back of the olive does the job. NEVER try to get away with soft solder for this application. The process of silver soldering the olive to the pipe anneals the brass and it only requires a very modest tightening of the union nut to ensure a sound joint, the olive bedding into the female part of the union to form a good seal. I can honestly say that I have never had a leak from a joint made in this way. The end of the pipe should, of course, be cut square and thoroughly de-burred before fitting the olive. I always cut my pipes with a junior hack saw and clean up with a fine file and a scraper. Roller type cutters are available for small pipes and produce a square end, but beware – they tend to produce large burrs in the inside of the pipe which restrict the bore. This restriction is proportionately greater the smaller the pipe.


Machining an olive



Four bolt flange joint with olive seal

Finally, if you would like to use a flange joint but do not want the hassle of making tiny gaskets (which will probably be a source of leakage) the

arrangement shown in the sketch uses an olive as the sealing medium and the flanges to clamp the joint together. The bolting is still a fiddly job however and I will be explaining how I get round this in a future article.

CSMEE Library

As you all know our Library contains books covering a wealth of information on all aspects of our Hobby, of Model Engineering. Probably the most referred to are the bound Reference volumes of **The Model Engineer** and **Model Engineering in Miniature.** These volumes are kept up to date by Society members donating their magazines to the library when they have finished with them. I then have them Bound by Avalon Associates in Chelmsford.

Currently the **Model Engineer** is kept up to date by Geoff. King donating his copies.

In the case of **Model Engineering in Miniature** the late Les Hammond donated his copies.

At the present time to bring **Model Engineering in Miniature** up to date I need All copies of the magazines for volume 27 - July 2005-June2006.

We have volumes 28 & 29 which have been bound and are in the Library.

For volume 30 July2008-June2009 I have the July, August, September, October and December magazines. I need November and all future magazines in order to keep up to date.

If there is any member/members willing to donate their magazines please contact me or a committee member.

Norman Patrick

Website

The website csmee.co.uk continues to attract a good number of visitors. The number of pages viewed per visit is on the increase, with Notice Board, Events Diary and Recent Events still the most popular. These pages should be checked regularly as they are updated frequently with the latest news and dates for future events. We know the website has attracted some new members and visiting clubs use it to find where we are. They can also see what we have to offer from the photos and recently added track plans. I would like to thank the people who help me by sending reports and photos. If anyone has any comments and suggestions or is interested in taking over the website in the future please speak to me or email webmaster@csmee.co.uk

Email - Any member who would like to receive notice of important website updates, routine communications and also get urgent club information please make sure your email address is held by the Secretary: - email secretary@csmee.co.uk

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