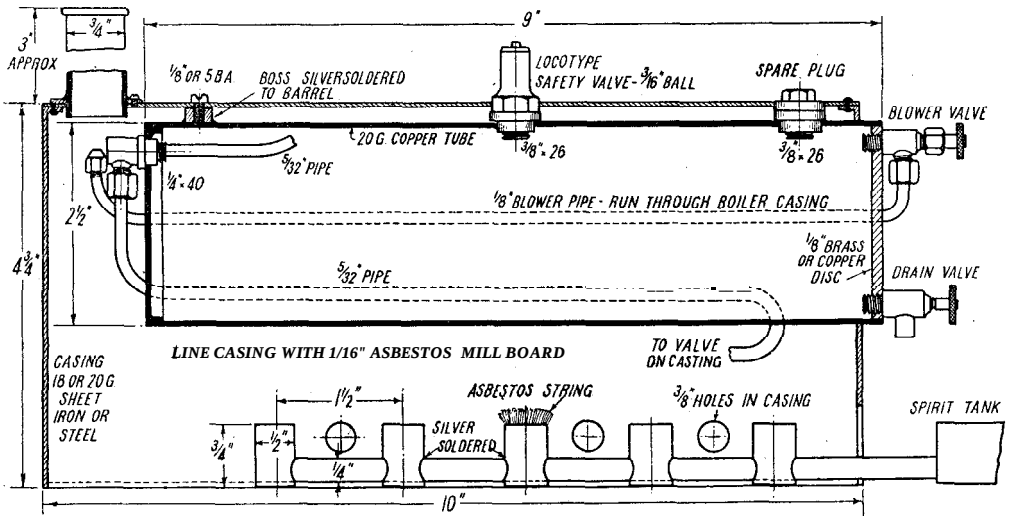
A Steam Calliopette by " L.B.S.C."

Something for the Kiddies-
This'll make 'em whistle !

SUNDRY followers of these notes have been reminding your humble servant lately, that if I proposed to describe something that they could make for amusing the kiddies around Christmas time, not to leave it until the last minute. Some of them are slow workers, others are short of spare time, and so on. O.K., well, as these notes should appear about the middle of October, all being well, there should be plenty of time for the average worker to make the box of tricks set out below. As I have previously described various kinds of toy locomotives, stationary engines, and so on, I thought we would have a bit of a change, and so am offering something which is a little out of the ordinary. When I first saw and heard a steam-operated calliope at Greenwich, Conn., around 23 years ago, I thought at the time, that a wee one could easily be made from locomotive components ; but this 'Is the first time I have ever got out a design for it. The steam part of it isn't complicated enough to be beyond the ken of any intelligent kiddy, either boy or girl ;and the musical (did I hear somebody laughing ?) part is so simple, that the operator should be able to play simple tunes after only a few minutes' practice. If dad or mum can play the piano, they will probably be having a go themselves ; if the little calliope whistles are properly tuned, which is easy enough to do, the notes will blend perfectly, and a tune played in chimes should sound very pretty indeed. Now to construction.

The boiler is easy enough to make, being a plain barrel in a rectangular casing, and can be fired either by a spirit lamp as shown, one of my oil burners as described in the ***Live Steam Book,*** or by a gas burner. The barrel is a 9 in. length of 2-1/2in. seamless copper tube, 20 or 22-gauge, squared off at both ends in the lathe. The front end is closed by a flanged fdisc o I6-gauge copper, made in the same way as described for loco-type smokebox tubeplates ; the back end is closed by a disc of 1/8in. copper, or a stamped brass blank would do. Bevel the edge a little, to form a channel all around for the silver-solder, with which both ends are fixed. The 1/8in. metal allows the fittings to be screwed in without



Section of boiler for the small calliope

bushes. One 1/4 in. x 40 bush is needed in the front plate, for the superheater elbow, and two 3/8in. x 26 bushes in the upper part, for the safety-valve and plug. A spare plug is shown, as the boiler could then be used for testing, by screwing a valve or other fitting in the plug bush.

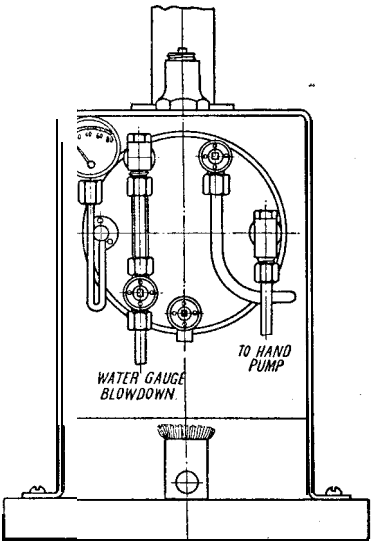
The boiler casing is made from 18- or 20-gauge sheet steel, or stout tin would do quite well, a piece measuring 10 in. X 13-5/8 in. being required. Bend 1/2 in. of each shorter end at right-angles, to form the bottom flanges, then bend the rest mto a channel, 4-3/4in. high and 3-1/8 in. wide as shown. A piece approximately 5-1/2in. x 3-3/4in. will form the front end, the edges being bent over to fit inside the casing, to which they are riveted by 1/16in. iron rivets. The back end is I in. shorter, the bottom part being left open to admit the

burner. A 2-1/2in. hole is cut in this, to let the boiler barrel come through. The casing is lined with 1/16in. or 3/32-in. asbestos millboard, fixed with 1/16in. iron rivets with large sheet-metal washers between the heads and the asbestos. At 3/4 in. from the front end, on top of the casing, drill a 3/4in. hole for the chimney ; at 5 in. beyond this, drill a 5/8in. hole for the safety-valve, and a similar hole at 1 in. from the back end, for the plug. A No. 30 hole is also needed at 1-1/4 in. behind the centre of the chimnev hole. for the screw holding up the front end of the boiler. Put the boiler temporarily in place in the casing, so that it projects 1/4 in. through the hole in the back ; see that the superheater bush is at the top of the front end. Then mark through the holes in the casing, the positions of fixing screw, safety-valve bush, and plug bush. Remove boiler, drill 1/2in. holes for safety-valve and plug bushes, turn them from bronze or gunmetal rod, and silver-solder them in. A little boss is silver-soldered on to take the fixing screw, as shown.

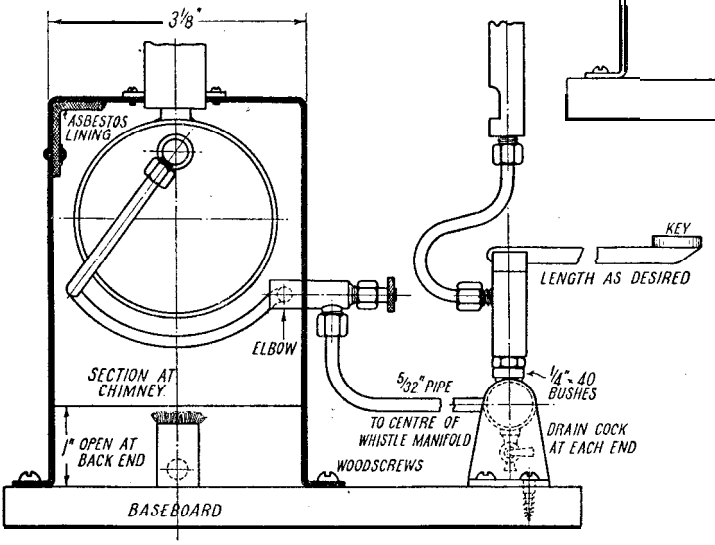
Boiler Fittings

The boiler fittings and mountings are all of my " regulation " type, and full details of how to make them have been given " many a time and oft," so no repetition should be needed. An elbow fitting made from 3/8in. round rod, carrying a 1/4 in. x 40 union nipple, and a piece of 5/32-in. pipe as shown (both silver-soldered in) is screwed into the bush in the front end of the boiler barrel. The superheater is a loop of 5/32-in. copper tube, furnished with a union nut and cone for attachment to the elbow. It goes between boiler and case, to the rear end, dips below the barrel as shown in the end view, and returns along the other side, terminating in an elbow, to which it is silver-soldered. One of my " standard" 5/32in. angle valves, as used for controlling steam supply to injectors, blowers, etc., is screwed into the elbow through a 1/4in. hole drilled in the casing, as shown both in the end view, and the detail sketch. Thus the superheater loop is always full of steam when the boiler is in use.

The loco-type safety-valve contains a 3/16in. ball on a 5/32-in. reamed and D-bitted seating ; it should be set to blow at about 50 lb. The plug is turned from 5/8in. rod. The blower valve is another of my " standard " steam valves, screwed into the 1/8in. end plate. The blower pipe is 1/8 in. diameter, attached to the nipple on the valve by 1/4in. x 40 nut and cone. This goes between casing and chimney, via a hole in the back of the casing, and has a blower jet screwed on to the end ; this is drilled No. 70. The projecting end of the boiler barrel carries one of my locomotive water gauges, with 5/32-in. glass ; a steam gauge, which needs only to read to 80 lb. ; a dram valve, similar to the blower valve, but minus pipe and gland ; and clackbox or check valve for boiler feed, containing a 5/32-in. ball on a 1/8in. seating. The pipe from this can be attached to a hand pump, mounted on the base-

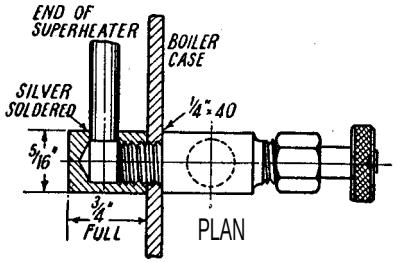


Back end of boiler



Left-Chimney end of calliope. How to connect up

board ; the pump is made to the instructions given for tender pumps, excepting that the bottom valve cap is made like those specified for eccentric-driven pumps, and a suction pipe attached. A rubber tube may be slipped over the suction pipe, and dropped into a cup or other receptacle containing water, when the boiler " needs a drink." The chimney is a 3-in. length of 3/4in. tube, with a flange about 1-1/4 in. diameter



Main steam valve

silver-soldered to it, 1/4 in. from bottom, same being screwed to the casing as shown. The beading at the top is half-round 1/16in. wire, silver-soldered on.

The spirit-burner (" poison-gas plant ") shown, consists of five 3/4in. lengths of very thin brass tube silver-soldered to a 1/4in. feed pipe as shown ; discs of thin brass are silver-soldered to the bottoms of the tubes. A nick is filed in the feed pipe, where it passes through the burner tubes, to supply spirit to the wicks of loosely-packed asbestos string. The spirit tank is a rectangular reservoir about 1-1/2 in. square and 3/4 in. high, it need not be very large, as it can be replenished easily when the boiler is in steam. Four 3/8in. holes are drilled in the casing at each side, as spirit needs plenty of air " to take the poison out of the gas," as one of my correspondents put it. Alternatively, one of my " improved Carson-type " vaporising paraffin burners could be used ; or a gas burner, as described some time ago for boiler testing. Incidentally, apart from its use as a " melody-maker," this boiler would drive a stationary engine with a cylinder 5/8in. bore and I in. stroke, in which case the hand pump could be dispensed with, and water supplied by an eccentric-driven pump 3/16in. bore and 1/4in. stroke, worked off the crankshaft. The exhaust should be turned into a blastpipe fitted below the chimney, same as in a locomotive smoke-box.

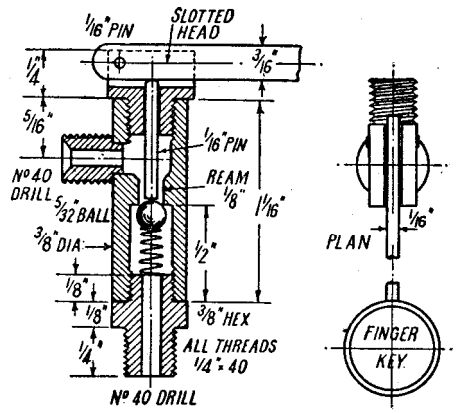
The Mechanical Part

The manifold carrying the whistles is a piece of 1/2in copper tube supported by brackets as shown, made of sheet copper and silver-soldered to each end ; two dram cocks are needed, to get rid of condensate water when starting from cold. The length of the tube depends on the number of whistles you would like to install. For the tunes the kiddies would play, the minimum would be, say, one complete octave-eight full tones and five semitones-with five or six notes above and below the range of the octave ; about.25 in all. The tune which was my favourite in childhood days, Schubert's Serenade (I still love it) could be played on that range. Anyway, it is the builder's choice. The whistle bushes, made from 3/8in. rod and tapped 1/4 in. x 40, are spaced between 5/8 in. and 3/4 in. apart, and silver-soldered into holes drilled in a straight line along the top of the manifold tube. This is connected to the steam valve on the boiler, by a 5/32-in. or 3/16in. pipe silver-soldered into the centre of it, and furnished with a union nut and cone, the attachment being shown in the end view, which also shows how the manifold is mounted on the base-board.

The Whistle Valves

These form a simple lesson in mass pro. duction ; one is shown in the section. For the nipples, part off as many 1/2in. lengths of 3/8in. hexagon brass rod, as will be needed for all the whistles. Centre each, and drill a No. 40 hole clean through. Turn down 1/4 in. of the outside to 1/4 in. diameter ; screw 1/4 in. x 40 ; reverse in chuck, and repeat operation for 1/8 in. length. If you note the reading of the " mike " collar on the cross-slide handle when turning the first to size, no further measurement is needed if the handle is set to the same reading (or in the same position, if no collar is provided) for the rest of the nipples. Chamfer the corners of the hexagon.

Part off enough 1-1/16in. lengths of 3/8in. round rod for the bodies. Centre each, and drill through No. 34. Open out and bottom to 1/2 in. depth with 7/32-in. drill and D-bit ; tap 1/4 in. X 40. Reverse, open out to 7/32 in.



Whistle valve

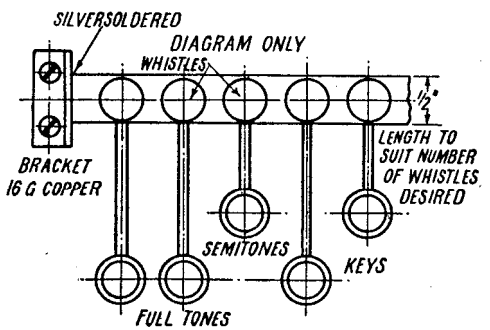
diameter for 7/16 in. depth, and tap as before ; run a 1/8in. parallel reamer through the remains of the No. 34 hole. Drill a 5/32-in. hole in the side, into the shallower hole, 5/16 in. from top, and fit a 1/4 in. x 40 union nipple in it ; silver-solder the lot at one heating. Seat a 5/32-in. ball on each D-bitted seating, and assemble as shown, with a light spring of hard bronze wire between ball and cap.

Part off sufficient 7/16in. lengths of 7/16in. rod,

for the slotted nipples ;centre each, drill No. 51 right through, turn down 3/16 in. length to 1/4 in. diameter, and screw 1/4 in. x 40. File a flat each side of the head, and slot a full 1/16 in. wide and 3/16 in. deep. Failing a milling machine, the quickest way of doing this is to drill and tap a 1/4 in. x 40 hole in the end of a bit of square rod, 3/8 in. or larger ; screw a nipple into it, and set it in a machine-vice (regular or improvised) on the lathe saddle, at such a height that when traversed under a 1/16in. saw-type cutter mounted on a spindle between centres, the cutter forms the 3/16 in. depth of slot at one traverse. Unscrew the slotted piece, screw in a blank, traverse under the cutter, and ditto repeato until the lot are done -it won't take long ! File the flats afterwards if this method is adopted. The push-rods are made from 1/16in. rustless steel or nickel-bronze rod, for preference, but anything may be used at a pinch ;same applies to the 3/16in. x 1/16 in. levers. The keys are simply discs of brass, parted off a 1/2in. rod and soldered to the ends of the levers. They won't get hot, as the heat will dissipate before it could reach them. Screw all the valve bodies into the manifold, and then fit the top nipples and the levers.

The Musical Part

The actual whistles are made exactly as I have described for tube-type locomotive whistles ; the only difference is in the tuning-up. The actual size of the whistle depends on whether you want shrill or deep tones. Thin brass tube of about 7/16 in. diameter would give medium tones. Make up a whistle with a tube say 4 in. long ; leave the top open, and fit a plunger and rod in it, as shown in the illustration. If you leave out the union, for a kick-off, it can be sounded by lung power ; just blow into the bottom end, and adjust the plunger until it gives the highest-pitched note that you require. Measure how

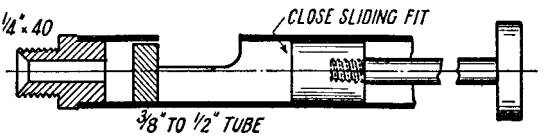


Plan of keyboard

far the plunger is down the tube, and make another whistle with the tube cut down to the measurement indicated, finishing off with the usual cap and union. Now adjust the plunger in the test whistle for a tone lower, and ditto repeato operations until you have sufficient whistles for the desired range of notes. For the deeper tones, a larger diameter tube can be used, which will reduce the length of the whistle. It may sound a long and tedious job, but once you have found out how much longer the tube should be, to give one note lower on the scale, it is an easy matter to cut the lot into the requisite steps. When all the whistles are made and tuned up, attach each one to a valve, by a swan-necked piece of pipe with two union nuts and cones, as shown in the end view of the whole doings.

How to Operate

To get clear notes, the steam must be hot and perfectly dry, so don't fill the boiler more than halfway up the gauge glass. If hot water is used,



How to tune whistles

it will save the spirit ; and if an adapter is screwed into the front end of the casing, with a pipe and auxiliary blower jet under the chimney, a tyre pump may be used to assist in quick steam raising. When steam is up, open the main steam valve, and the drain cocks on the manifold. I forgot to mention that pipes should be attached to these, to take the condensate water clear of the baseboard. When dry steam issues from the cocks, the little calliope is ready to play, and the cocks may be closed. If you now touch the right keys at the right time, you can hear the " Blue Bells of Scotland," " OL' Man River," " God Save the Queen "-in fact anything short of Mozart and Beethoven ! As the boiler will make plenty of steam to blow two or three whistles at once, by regulating the blower valve, the keys can be operated in much the same way as those of a piano-accordion, and the resulting chime notes should sound very pretty. The success or failure depends on the making and tuning of the whistles ; if they are O.K. there should be no signs of overtones, blasting, or screeching, but just pleasant music.

Playing Tunes

Children can be taught to play tunes in a very simple manner. Mark the keys of the octave C, D, E, F, G, A, B, C, also those full notes above and below it, in capital letters. Mark the half-tones with small letters, e.g. " c " between C and D, " d " between D and E, and so on. Write the notes of the tune, in fairly large characters, on a paper, and stand it up at the back of the calliopette, where the kiddy can read it easily ; a toy easel would be just fine. Space out the letters according to whether the notes are long or short. All the kiddy has to do, is to read the letters, and touch or hold down the correi-ponding key. Alternatively, mark the keys in old notation characters, or doh-ray-me, as you fancy, and play from ordinary. music. Well, there is something out of the ordinary ; and in fancy I can already hear the strains of what the kiddies call " Good King Wencerslosh " whist-ling over the air on Christmas morning !