Locomotive ash pans and grates

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When Cinderella had a spot of bother clearing up the hearth she found a way round it with a bit of help from her Fairy Godmother. I thought this might work with locomotive grates and ashpans but so far, I`ve had no luck; I have just finished my 7th and the problems don´t seem to go away. Of course, the degree of difficulty in fitting up a satisfactory grate depends on the type of engine, particularly the wheel arrangement, as well as the brake rod layout. This is not just a modeller`s problem, about 100 years ago in the post 4-4-0 era it pretty well flummoxed many locomotive designers. The standard Victorian engine was a 6-wheeler, later extended into a 4-4-0, with sufficient space between the rear axles to accommodate the firebox with an ashpan bolted on beneath. This arrangement was ideal as it allowed a deep firebox (plenty of fire and heating surface) and it left adequate space for a big ashpan so the engine could run a considerable time before it needed cleaning out, a job done the hard way in a pit of course. As engines grew in size part of the grate ended up located above an axle, usually at the back, so ashpans had to be made in fancy shapes to get over them and there were problems with cinders building up and insufficient air passing through to burn the necessary amount of coal.

The 4-6-0 was difficult to deal with, particularly when designed along the lines of an extended 4-4-0 with inside cylinders driving the front axle so that the middle axle was under the firebox; several companies tried this wheel arrangement with so little success that they resorted to Atlantics whose rear axle left more space. The problem was identified early on at Swindon and, as usual at that establishment, a great deal of effort was put into finding an engineering solution. The result was a particularly complex form of ashpan for Churchward`s first 4-6-0. However, this was so successful that no further change was necessary in the hundreds of engines that followed.

As if all this were insufficient to deter builders of small locomotives from modelling more complicated engines, the hobby has grown up with the idea that ashpans and grates should be instantly removable at the pull of a pin. I think this is a feature from the pre-war “LBSC” era. Now I do not deny the convenience of simply dropping an ashpan and grate (plus fire) in one fell swoop at the end of a run and then simply replacing them when cold, but in models of some prototypes this is just not possible to do. For those enginemen who fear ending up with lots of hot coals on the grate and very little water in the glass there is a much better emergency response than fiddling around trying to pull a pin from between the wheels then leaving the whole thing, including fire, sitting under the engine on the 3½” rail: simply stuff a driver`s cloth over the chimney and open the blower valve! Try this next time you are about to dump the fire at the end of running, I doubt the coals will remain alight for even 30 seconds. Steam fills the firebox and the fire dies due to lack of oxygen and cooling by water vapour, there is far too little residual heat to raise the temperature of the 30lb or so of copper in the boiler by more than a few degrees.

My first two engines were typical 0-6-0 and 4-4-0’s so their grates were the usual simple model arrangements with firebars supported from the ashpan which was itself held against the underside of the foundation ring by a rod passing through the frames. The pans were deep enough to hold ashes from an hour or two in steam and plenty of air could pass through holes at the front and openings at the back (very important if the fire is to burn well, this was an essential part of Swindon´s success.)

The next model was definitely more difficult, its firebox was sufficiently high above the coupled axles to admit a reasonable depth of pan, but unfortunately it was located exactly over the middle axle so a simple drop was absolutely out of the question. The first step was to eliminate the brake beam of the middle axle and use stubs on the rods, this left sufficient space to pass the front of the ashpan up between the rear axles and push it forward over the middle axle. Actually, even this did not quite work as the pan touched the foundation ring

before it could be levelled in front of the back axle: the final resort was to make the pan just narrow enough to pass inside the firebox so it could then be tipped horizontal before lowering and fixing in place by 4 long screws through the frames. Although this sounds complicated, once I had a bit of practice it was not too difficult to do, as long as everything was cold of course.

My next effort was a 4-6-0 of the more difficult variety due to its big wheels (high axles) and position of the rear axle just over half way along the firebox. Rather like the GWR people I knew I had a problem to solve. The sides of the pan have cut-outs for the axle with the floor going over a hump, the ashpan is supported on brackets from the frames and cannot of course be removed with the boiler in place. Ash is supposed to fall to either side of the hump and the floor has trapdoors front and back, the rear one opens just to remove ash but the front trap is nearly half the length of the ashpan and is big enough for the grate to pass through. I then redesigned the run of the brake rods to take them outside the width of the trapdoor.

The grate is a Blackgates Eng. standard made of tapered stainless bars welded together, I have used them on several models and find that they do a good job. In this case the rear end rests on a round bar fixed across the back of the pan and the front is supported on two steel legs silver soldered to bars. It is quite easy to slip the back of the grate up through the door, sit it on the cross bar and push the legs up before shutting the trap. The whole thing works well other than the inevitable problem at the shallow bit over the hump where cinders tend to stick and the firebars burn away faster, although perhaps I am being fussy as they do last for quite a few years.

With the Compound I had a lucky break as although it is a 4-4-0, with a firebox too long to fit between the axles the grate slopes and the ashpan has a shallow rear section that slips over the back axle so that the whole can be dropped.

The Jumbo currently in the "Works" I thought would be a doddle, a Victorian 2-4-0, easy! Actually, there were a couple of complications: the frames are very shallow and the firebox projects below them so they cannot be used to support the ashpan and there is a brake beam with a central pull rod equidistant between the axles right under the pan. The latter was sacrosanct as it affects the appearance of the model. The photos show what I came up with. The foundation ring lies below the frames, and the ashpan fits closely round the projecting sides of the inner firebox and it is semi-permanently attached to them with screws. The front half of the floor is hinged to come down just in front of the brake beam and I fitted the grate the same way as on the Claughton: the back rests on a cross rod and legs support the front. As can be seen the trapdoor is just sufficient to allow the grate to be removed for cleaning. Don´t ask me what I would do with a wide firebox, the North Western and Midland did not use them, so I leave the delights of removing sections of grate through the firedoor to those who like building Pacifics!