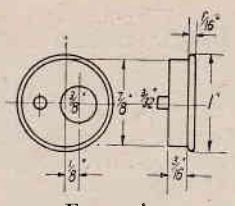
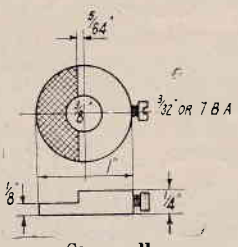
one or two more at the point where the firebox goes between frames.

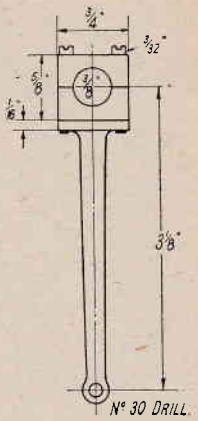
The superstructure requires little comment; as Mrs. Beeton might remark, it may be "added to taste." For the L.M.S. "4F" outline, the running-boards or side platforms are strips of metal 1¼ in. wide, attached by bits of angle. Openings are cut out to clear the wheels, and splashers made to fit over them. An edging is fitted for sake of appearance; this may be angle, or merely a soldered-on strip. The cab may be made from 1/32-in. metal; stout tin would do. It can be soldered up complete, and attached to running-boards by a couple of small angles, with screws underneath. Steps may be tin, and screwed on. The loop ends of a few 1/16-in. commercial split pins would make fine handrail pillars. Buffers may be made same as described for other engines in these notes, and a plain three-link coupling can be made from 13-gauge wire, attached to a hook filed from 3/32-in. steel. I don't think there is any need to go into further detail for a "toy"; as to the tender, this is merely an "ornament," and can be made from sheet steel, or even stout tin, in three or four evenings. All being well, I will give an outline drawing of it soon.



Eccentric.



Stop-collar.



Connecting-rod.

P.S.—"Petrolea"—Important!

Sorry I forgot to mention that the spring on the stationary pawl of "Petrolea's" lubricator is a "push" spring, erected slightly in compression.

A 7-in. Gauge Locomotive

(*Continued from page* 538)

put in the obvious place, on top of the smokebox, it would have appeared too far back on the finished engine.

The firebox is rectangular: 7 in. long by 6 in. wide, riveted to the boiler and lined with ¼ in. hard asbestos sheet. The door is on one side to facilitate the stoking of a tank engine. It is bolted to the rear of the chassis, and constitutes the rear boiler support.

A duct, 1½ in. deep, runs under the boiler from firebox to smokebox. Flames travel partly through this and partly through the fire-tube. Steam-dome and safety-valve are founded on a large union connection for a garden hose. Steam is collected through a detachable fine-mesh wire gauze, but whether this precaution is really necessary has not been discovered.

The "body" is of 22-gauge sheet and serves mainly as a disguise, and also prevents heat losses from the "motor." It was made originally to cover a similar chassis driven by a ¼-h.p. electric motor. The chimney was made from sections of a bulb horn and a klaxon, and the safety-valve cover started life as the old-fashioned domestic bell. A flange (of 1½ in. diameter curtain-rod) was soldered to the top. Of the many improvisations, the buffers gave more satisfaction than anything else. They are constructed entirely from valves, valve-springs, and valve-guide housings of what was believed to be a 1917 aero engine. Except for turning a shade off the valve heads (I was surprised to be able to do this with ordinary tool steel) and cutting a bit off the springs, it was simply a matter of reassembling the same things in different positions. I must add that the smokebox door through which the engine is inspected, oiled and (at present) reversed is a reinforced saucepan-lid, and the pressure gauge a discarded (dial type) car-tyre gauge.

To the expert, of course, there is gross inefficiency in valve gear with no cut-off, a boiler containing little else but water, and a firebox that is anything but wet! But the fact remains that the engine works, pulls a load of five—all the train will carry—with no hesitation except on a start from T. or B.D.C., on 30 lb. of pressure and can be managed by a boy aged nine. Tractive effort is about 16 lb. on the balance at low speeds, normal speed about 5 m.p.h., and it runs three hours without touching the water-pump. It is easy—too easy—to see how the design could be improved, but apart from raising the gear and the boiler pressure, it will probably be left as it is, because it cost little in time and less in materials, and warrants no further expenditure of either!