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Forced Lubrication for Axle Boxes

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This article describes a system of forced lubrication as arranged for the driving axle-boxes of some of the steam cars of the Taff Vale Railway Co. Before entering into a detailed description of the system used, it will perhaps be advisable to give a few of the more necessary particulars concerning these cars.

The engine is carried on a four-wheeled truck of 9 feet 6 inches wheel base and 2 feet 10 inches diameter wheels, the boiler of double-ended locomotive type, lying transversely across the frame) being placed immediately over the centre of the leading or driving-axle. The front end of the coach is supported by means of a bogie centre, carried between the frames at a distance of 4 feet from the trailing axle, or 5 feet 6 inches from the leading axle. When the car is loaded with its full complement of passengers, the weight on the driving axle is 15 tons 13 hundred-weight, the weight at the rail being 17 tons 6 hundredweight. The journals are 6 inches diameter by 9½ inches length; therefore, the pressure, taking two-thirds of the projected area of the brass as bearing area, is 466 pounds per square inch, the number of the revolutions of the journal, at a speed of 30 miles per hour, being practically 300. With this pressure and high rubbing velocity an undue amount of oil was being used with the ordinary method of lubrication, while cases of the bearings running hot were not infrequent, therefore, the following arrangement for lubricating the journals under pressure was adopted.

To a cross-stay in front of the driving-axle, Fig. 1, a small gun-metal tank of rectangular section, Fig. 2 is fixed. On the side of this tank, nearer the driving-axle and in connection with the tank, two small rotary pumps—right and left-handed—are fitted, the one for forward running and the other for backward running. These pumps are driven directly from the driving axle by means of a belt passing over a flanged pulley carried midway between the pumps, the pulley containing on each side of it a roller-clutch, somewhat similar to a free-wheel arrangement, fixed to the driving spindle of the pumps. By these means, the one belt drives either pump forward or backward, the other pump being free.

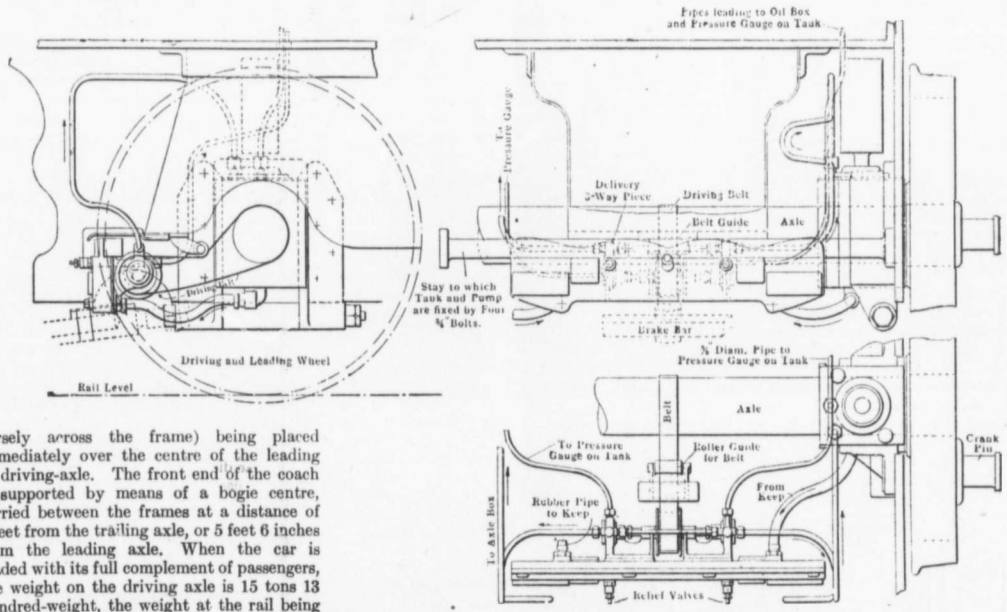

Fig. 1—A System of Forced Lubrication for an English Freight Car.

Following the process through, for the lubrication of one of the journals, when the car is in motion, oil is pumped from the tank and forced through a coiled copper pipe to the top of the axle box, Fig. 3. An oil channel, 8¼ inches long, 9-16 inch deep, is cut in the crown of the box, leaving a margin of metal at each side of the channel of ⅜ inch flat, which is found, when the box is properly bedded to the journal, to be quite sufficient to insure that it shall be perfectly oil-tight at the pressures attained.

After passing round the journal, the return oil is collected in the axle box keep, and from there is brought back to the tank by means of a flexible pipe which allows for the rise and fall of the axle box, care being taken that the reservoir into which the oil is returned is sufficiently below the keep to drain it. At each side of the axle box keep a half ring is fitted with bearing area about ⅜ inch wide. These half-rings are bedded well to the axles, and are supported upon a couple of small coil springs which hold the rings up to the journal with a fair pressure, and so prevent the escape of oil along the journal on the bottom side. The supply tank is so arranged that the return oil, after draining from the keep into it, shall pass through a filter before being again sent through the pump. Such briefly is a general description of the method adopted.

Many points arise, however, in regard to the working of the arrangement which it will be well to explain. In the first place, the pumps when running fast (at a speed of 30 miles per hour, the revolutions of the pump are 440 per minute) deal with a greater quantity of oil than can be accommodated in the circuit at a pressure of, say,