Feb. 14, 1933. E. F. SULLIVAN 1,897,827.

OILING APPARATUS FOR LOCOMOTIVE DRIVING WHEEL FLANGES

Filed March 16, 1932

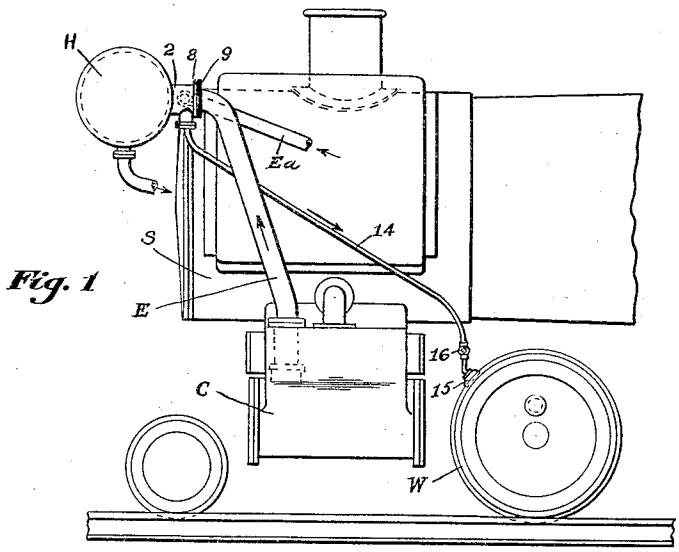

Fig. 1

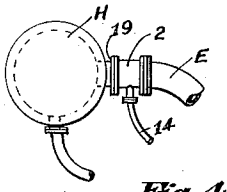

Fig. 4

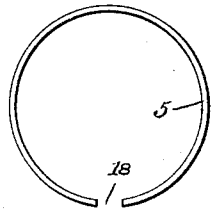

Fig. 7

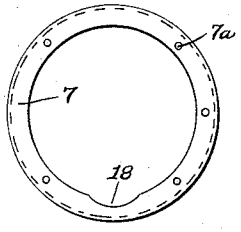

Fig. 5

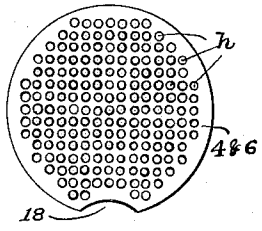

Fig. 6

Fig. 2

Fig. 3

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UNITED STATES PATENT OFFICE

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OILING APPARATUS FOR LOCOMOTIVE DRIVING WHEEL FLANGES

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In operating locomotives over the curved portions of railways there is a tremendous thrust exerted by the driving wheel flanges against the inner side of the rail tending to produce excessive wear of the two impinging surfaces. It is more serious with respect to the wearing tendency on account of the fact that at this particular point of contact between wheel and rail there is a rubbing engagement of the surfaces in contrast to a simple rolling effect, which latter takes place between the tread portion of the wheel and the top of the rail.

To alleviate this difficulty it has been a common practice to lubricate the outer side of the wheel flange by means of an independent oiling system operated from the cab of the locomotive and requiring more or less constant attention on the part of the locomotive crew.

As the cylinders of the driving engines require ample lubrication and the exhaust steam from these cylinders is more or less saturated with this oil, I have conceived of the idea of utilizing a part, at least, of this lubricant for the purpose of protecting the flanges, and the rails, by segregating the unctuous portion of the exhaust steam and delivering it in regulated amounts to the driving wheel flanges. Thus two objects are accomplished—lubricating the wheel flanges and avoiding the necessity of providing an independent apparatus for doing this work, which involves time and labor on the part of the attendants.

In my present invention I handle this flange oiling duty by what might be termed a straining operation. The oil-impregnated exhaust steam just prior to its entrance to the feed-water heater impacts on perforate baffle plates, a considerable portion of the oil collecting on the baffles and descending to the oil-conveying pipe to the wheel flange, means being employed to regulate the delivery in predetermined amounts.

In the accompanying drawing I have depicted a preferable form of the apparatus which I use for the purpose of accomplishing the object of the invention, but I desire to be understood as not limiting myself to the precise mechanical details as disclosed as the invention is susceptible of a broad interpretation and the present disclosure is simply illustrative in its application.

In the drawing,—

Fig. 1 is a fragmentary side elevation of a locomotive equipped with apparatus according to my invention;

Fig. 2 is a fragmentary end view of a feed-water heater with the oil-separating elements shown in sectional elevation;

Fig. 3 is a view of the spray nozzle on the oil pipe;

Fig. 4 is a modified form of the invention, and

Figs. 5, 6 and 7 represent, respectively, the ring nut, strainer and spacing ring.

Similar reference characters are employed to identify like parts in all views of the drawing.

Referring to the drawing, C is the cylinder, E the exhaust steam pipe from the driving cylinders and H is the feed-water heater of a locomotive.

It will be observed that the exhaust pipe is shown exteriorly of the smoke-box S. In the present invention the exhaust steam which is usually admitted to the heater in one centrally located pipe is divided so that there are two smaller pipes, one from the exhaust chamber adjacent each of the two cylinders. The usual connection to the stack for draft purposes is, of course, retained. While the invention might be carried out by employing but one exhaust pipe to the feed-water heater the construction as I have illustrated and will describe it is preferred.

Incorporated in the side wall 1 of the heater H are two cylindrical structures 2 located, respectively, near each end of the heater. They are identical in form and each serves the drive wheel on its particular side of the locomotive and end of the heater at which it is located. The structure 2 is partly within and partly without the heater itself, and comprises an inwardly extending portion having an internal shoulder 3 against which the baffle plate 4 abuts. Lying outwardly of this plate (4) is a spacing

ring 5 and outwardly of the member 5 is another baffle plate 6. Each plate is perforated with holes the aggregate area of which is calculated to be at least two to three times the cross-sectional area of the exhaust pipe. This prevents retardation in the movement of the steam into the heater proper.

To secure the baffle plates in place I employ a ring nut 7 which is screw threaded to the interior of the member 2, and rotated by a spanner wrench, using the holes 7*a*.

On the outer end of the member 2 is a flange 8 to which the exhaust pipe flange 9 and the intermediate flange 10 are secured by bolts 11. A chamber 12 is thus provided for the purpose of allowing the exhaust steam to expand and more gradually pass through the holes *h* in the baffle plates. The expansion of the steam reduces its pressure and prevents too violent impact on the plates.

In the bottom of the expansion chamber 12 is an opening 13 communicating with a small pipe 14 through which oil separated from the exhaust steam, with more or less water of condensation are forced by the steam pressure to the driving wheel W of the locomotive, and on the lower end of the delivery pipe 14 is a nozzle 15 which sprays the oil on to the flange of the wheel. At a convenient point on the pipe 14 is a choke plug fitting 16 employed to automatically adjust the outward flow of the oil.

In addition to the steam from the exhaust pipes E I also direct to the feed-water heater the exhaust steam from the auxiliary units—such as the boiler feed pump, air pump and stoker engine where the latter forms part of the equipment of the locomotive.

The exhaust steam from these auxiliaries enters the expansion chamber 12 by way of the opening 17 at which point there is provision made for connecting the exhaust steam pipes E*a* leading from these units.

In operation, my driving wheel oiling system is automatic, requiring no especial attention. Entering the chamber 12 the exhaust steam is slightly reduced in pressure by expansion and its impaction on the plates 4 and 6 is therefore less forceful than would otherwise be the case.

As the aggregate area of the perforations *h* in each plate is calculated to be at least two or three times that of the cross sectional area of the combined exhaust pipes making connection with the chamber 12, the steam moves freely.

A natural characteristic of oil is its clinging quality when brought into contact with any surface, and in the present instance the oil impinging on the surface of the plates will slowly descend to the bottom edges thereof and finally collect in the lower portion of the chamber 12, and thence into the oil discharging pipe 14.

Oil passing through the holes in the outer plate and collecting on the inner plate will gradually work down to the lower part of the space between the two plates, and by means of passages 18, made by cutting away parts of the elements 4, 5, 6 and 7 is conveyed to the common outlet at 13.

In Fig. 4 is illustrated an alternate arrangement with respect to the location of the oil separating unit. In this instance the element 2, while constructed on the same general lines as the one just described, is made in the form of a detachable unit and may be employed conveniently on feed-water heaters already equipped with a flanged nozzle 19. The integrally made unit is, however, preferred construction.

A particular advantage in the use of my exhaust steam oil separator, beside those already recited, is that by extracting a large amount of the oil from the exhaust steam, hydrolytic action of the oil in the feed-water is greatly reduced, thus procuring a greater measure of protection to the boiler plates from the effect of acid condition often found in the feed-water.

Furthermore, as exhaust steam carrying considerable pressure is employed for spraying the oil on to the wheel flanges, a considerable conservation of live steam is effected, the latter being the ordinary method of accomplishing the spraying operation.

The additional cost of incorporating the present invention in the feed-water heater structure is not great, and it is believed that the advantages accruing by the use of this arrangement will justify its adoption as locomotive equipment for lubricating drive wheel flanges.

What I claim is:

1. In apparatus for oiling the flange of a locomotive drive wheel comprising in combination with the feed-water heater therefor, a cylindrical structure integral with said heater and disposed partly within and partly without the wall thereof, a flange on the outer portion of said structure to which the exhaust pipe from the driving cylinder of said locomotive is attached, a perforate plate secured within and transversely of said structure, an expansion chamber interjacent said flange and said perforate plate, and a discharge orifice opening out of the bottom side of said expansion chamber through which oil collecting in said chamber may pass outwardly thereof.

2. In apparatus of the class described adaptable for use on a locomotive, comprising in combination with the feed-water heater therefor, a cylindrical member extending inwardlly and outwardly from the wall of said heater and having both of its

ends open, an interior shoulder at the end of the inside portion of said member, a perforate plate abutting on said shoulder, a second perforate plate spaced outwardly from said first mentioned plate, a spacing ring interjacent the two said plates, a ring nut adapted to secure said plates within said member, a flange on the outwardly disposed portion of said member, the flange on the exhaust pipe from the driving cylinder of said locomotive being attachable thereto, an expansion chamber located between said flange and the adjacent perforate plate, means on said perforate plates, on said spacing ring and on said ring nut whereby oil collecting in the bottom portion of said cylindrical member, intermediate said plates, may pass outwardly to the bottom of said expansion chamber, an orifice opening out of said expansion chamber, and a pipe adapted to convey oil collecting in said chamber to the drive wheel of said locomotive.

3. In apparatus of the class described adaptable for use on a locomotive comprising in combination with the feed-water heater therefor, a cylindrical structure integral with and extending inwardly and outwardly of the wall of said heater, an expansion chamber within said structure adapted to receive the exhaust steam from the power units on said locomotive, a plurality of perforate plates transversely secured within said cylindrical structure in relatively spaced relation, the aggregate area of the perforations in each plate being in excess of the total cross-sectional area of the exhaust pipes carrying steam to said expansion chamber, an orifice opening out of the bottom of said expansion chamber, of relatively small cross-sectional area in comparison with the total cross-sectional area of said exhaust pipes, means to convey oil separated from the exhaust steam by impaction on said plates and deposited on the bottom, inside surface of said cylindrical member to the driving wheel of said locomotive, and a spray nozzle adapted to distribute the oil onto the flange of said wheel over a wide area thereof.

4. In apparatus for oiling the flange of a locomotive drive wheel comprising in combination with the exhaust steam pipes leading from the power units of said locomotive and a feed-water heater having a connection for the admission of exhaust steam thereto, an open end cylindrical member one end of which is adapted to be secured to said heater at the exhaust steam entrance thereto, a plurality of spaced perforate plates transversely disposed within said member, an expansion chamber outwardly of said perforate plates and into which the exhaust steam from said power units is adapted to be received before passing through said perforate plates in its course to said heater, an outlet for oil from said expansion chamber, a pipe making connection with said outlet and extending to said flange of said drive wheel, a nozzle on the end of said pipe adapted to spray oil over said flange, and means to regulate the discharge of oil from said oil pipe.

In testimony whereof I affix my signature.

EDWARD F. SULLIVAN.