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Design of Pneumatic Brake Equipment Diesel Logo Tem2

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Abstract:

The article is devoted to topical issues of the braking system of the TEM2 shunting locomotive operated on the railway of Uzbekistan. The article presents the brake lever transmission and its malfunctions, as well as the rationale for extending the service life of shunting locomotives at the earliest stage of their development. The inspection of the brake cylinder during the repair process and the scheme of their operation are also affected. In addition, the replenishment time of the brake cylinder is calculated using the auxiliary brake tap. The analysis of the brake pad replacement design has been carried out. The methods of position of the Crane handle No. 254 are investigated .

Keywords: Brake cylinder, rod, linkage, shoe, suspension, rod, shoe, beam, suspension, bracket.

Introduction:

Shunting locomotives of the locomotive fleet of JSC "Uzbekiston Temir Yillari" the service life has been exhausted for thirty years, new shunting locomotives have practically not been purchased from JSC "Uzbekiston Temir Yillari". The operational wear of shunting locomotives, on the one hand, and the steady growth trend in the volume of transportation on the railway transport of Uzbekistan (Uzbekiston temir yillari), on the other hand, prompted the search for radical ways to increase the number of traction units in operation. As one of the possible ways to solve this problem, it was proposed to carry out an overhaul with an extension of the service life of shunting locomotives after the expiration of the assigned service life (more than 50 years).

TEM2 is an industrial and shunting diesel locomotive produced by the Bryansk Machine–Building Plant and the Voroshilovgrad Diesel Locomotive Plant from 1960 to 2000. It is one of the most massive shunting locomotives in the post-Soviet space. A total of 6,225 copies were built.

Fig.1. Shunting locomotive TEM2

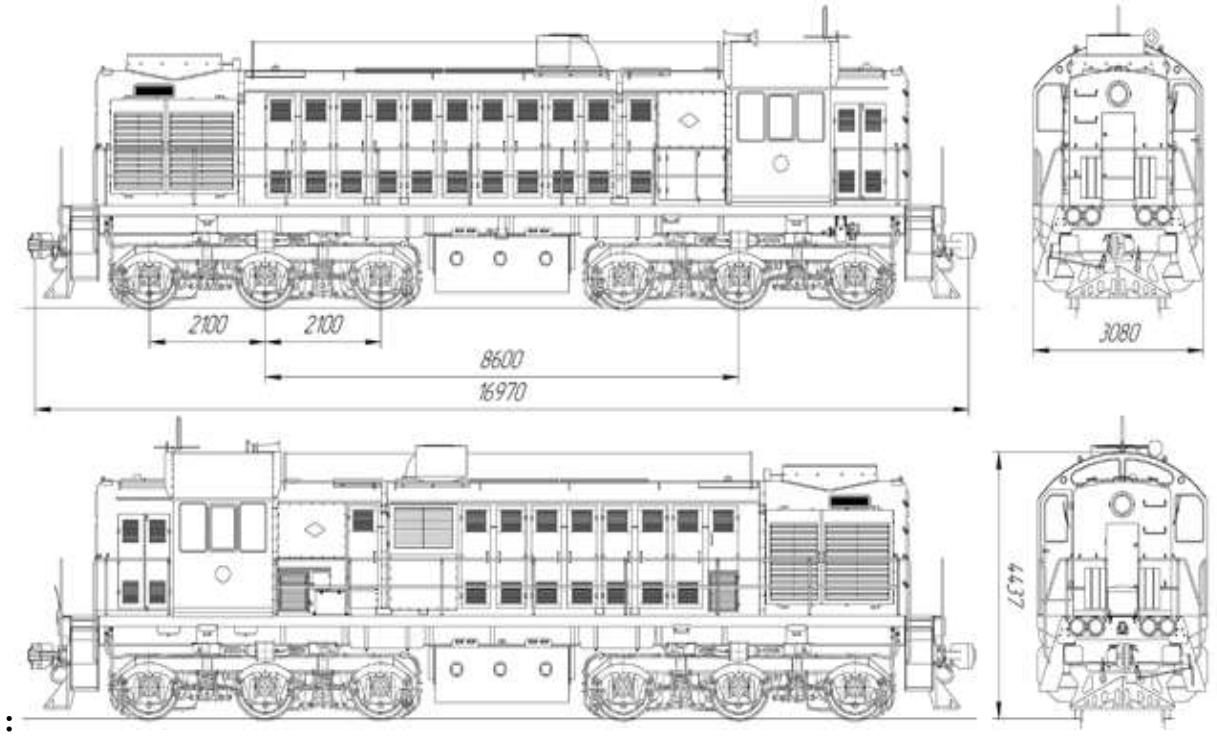

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Fig.2. Drawing in two projections of the TEM2 diesel locomotive :

Brake lever transmission TEM2 :

A brake lever transmission is a system of rods and levers by means of which the human force (during manual braking) or the force developed by compressed air is transmitted along the stem of the brake cylinder (during pneumatic and electropneumatic braking) to the brake pads, which are pressed against the wheels. The TEM-2 diesel locomotive uses gears with one-way pressing of the pads.

The brake lever gear (fig.3) consists of the following main parts:

- horizontal and vertical levers,
- traction,
- puffs (struts),
- Hand brake rods,
- suspensions,

- shoes
- pads.

In the transverse direction, the shoes are mounted on triangles or beams. Safety devices (suspensions, brackets, chains, etc.) are used to prevent parts of the lever transmission from falling into the path.

Fig. 3. Brake lever gear:

1 — brake pad; 2 — shoe; 3 — suspension; 4, 12 — screw tie; 5, 13 — safety brackets; b, 11 — vertical levers; 7.10 — horizontal balancers; 8 — brake cylinder; 9 — thrust

The lever brake transmission of the locomotive is powered by two brake cylinders located on the sides of the trolley frame and acting on three wheel pairs. Each brake cylinder 8 with a diameter of 10" drives a transmission on one side of the trolley. In this case, the horizontal balancer 7, turning around the brake rod roller 9, acts on a pivotally connected vertical lever 6, which, through a screw tie 4, brings the suspension 3 with a shoe 2 and a shoe 1 to the wheel brace. The transfer of forces to the brake pads of other wheels is carried out by means of a rod 9, a horizontal balancer 10, a vertical lever 11, a screed 12 and a suspension 14.

During the current repair of the TR-3, levers, suspensions, brackets, rods are carefully inspected and replaced if they have cracks, tear, fracture or local wear with a depth of more than 10% of the section of the part, brake cylinders are also checked (Fig.4). Parts with local wear of a depth less than specified are restored by surfacing followed by mechanical and thermal treatment. It is allowed to restore the traction lever or suspension by welding instead of the damaged part with a new one. Welding is carried out by an electrocontact method followed by a tensile test of the part. The load during the tests is taken depending on the section of the part at the rate of 12 kgf / mm2. If the gap between the parts of the articulated joints (non-removable sliding bearings) of the lever gear is more than 3 mm, it is restored to a normal value, as in spring suspension joints, by replacing bushings, welding holes and rollers with their subsequent processing. Couplings and forks of screw ties having a crack, torn or elongated thread are replaced. When the coupling is loosened along the thread, when the swing exceeds 1 mm, the end of the coupling is deposited in a hot state, and then processed and adjusted according to the thread.

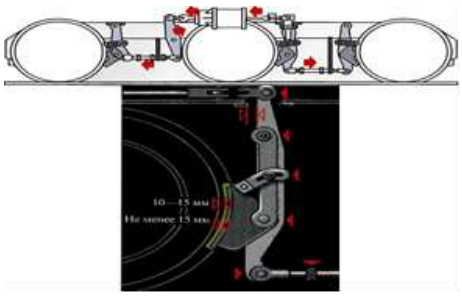

Fig. 4. The scheme of operation of the brake lever transmission and its malfunctions :

When the brake is released, the brake pads must stand 10-15 mm away from the riding surface of the bandage along the entire length of the pad and fit snugly to the brake shoes. The thickness of the pads is allowed to be at least 15 mm.

The free movement of the rods with an increase in the output of the brake cylinder rod (due to wear of the pads) is ensured by a cutout in the horizontal place of the frame.

When replacing the brake pads, the size "C" is adjusted within 70 +1° mm (controlled when the system is in a braked position).

Crane No. 254 has the following handle positions:

- I position — release position — for releasing the automatic brake of the locomotive. The handle moves automatically from position I to position II;
- II position — train position, in which the brakes of the locomotive are released, but their effect is ensured when the automatic brake is operating;

III, IV, V and VI — braking positions when moving the handle counterclockwise and release positions when moving it clockwise.

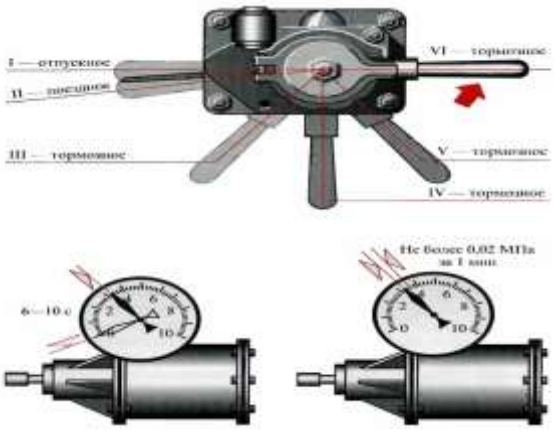

Fig.5. Crane No. 254 Fig.6 Checking the brake cylinders

It is necessary to check the filling time of the brake cylinders with the auxiliary brake valve by placing its handle in the extreme braking position, while the pressure in the brake cylinders should increase to 0.3 MPa in no more than 6-10 seconds, and the release time to a pressure of 0.04 MPa should not exceed 10-16 seconds.

To check the density of the brake cylinders, it is necessary to close the disconnecting valve on the air duct after filling them and check the pressure drop time in the brake cylinders, starting from a pressure of 0.35 MPa. A pressure drop of no more than 0.02 MPa per 1 minute is allowed.

Fault indication :

At the first stage of braking, there is no pressure in the brake cylinders.

At full braking, the pressure in the brake cylinders is above 4 kgf/cm2.

Slow air release on the brake cylinders.

The cause of the malfunction :

Incorrect adjustment of the faucet. Jamming or tight movement of the pistons .

Low lift of the two-seat valve, clogging of the filter mesh.

The method of elimination:

Rearrange or replace the cuff.

Clear the channels. In case of incomplete opening, change the piston or valve.

Conclusion: Thus, it is shown that timely detection of defects at the nodes of locomotives serve to extend the service life. It is shown that the state of the braking system determines the intensity of the locomotive's operation and its durability and operability. The presented inspection of the diesel locomotive brake cylinders allows you to describe the pneumatic processes in case of damage and malfunctions as reliably as possible. With the help of the proposed method of braking systems, work can be carried out to extend the service life of locomotives.

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