



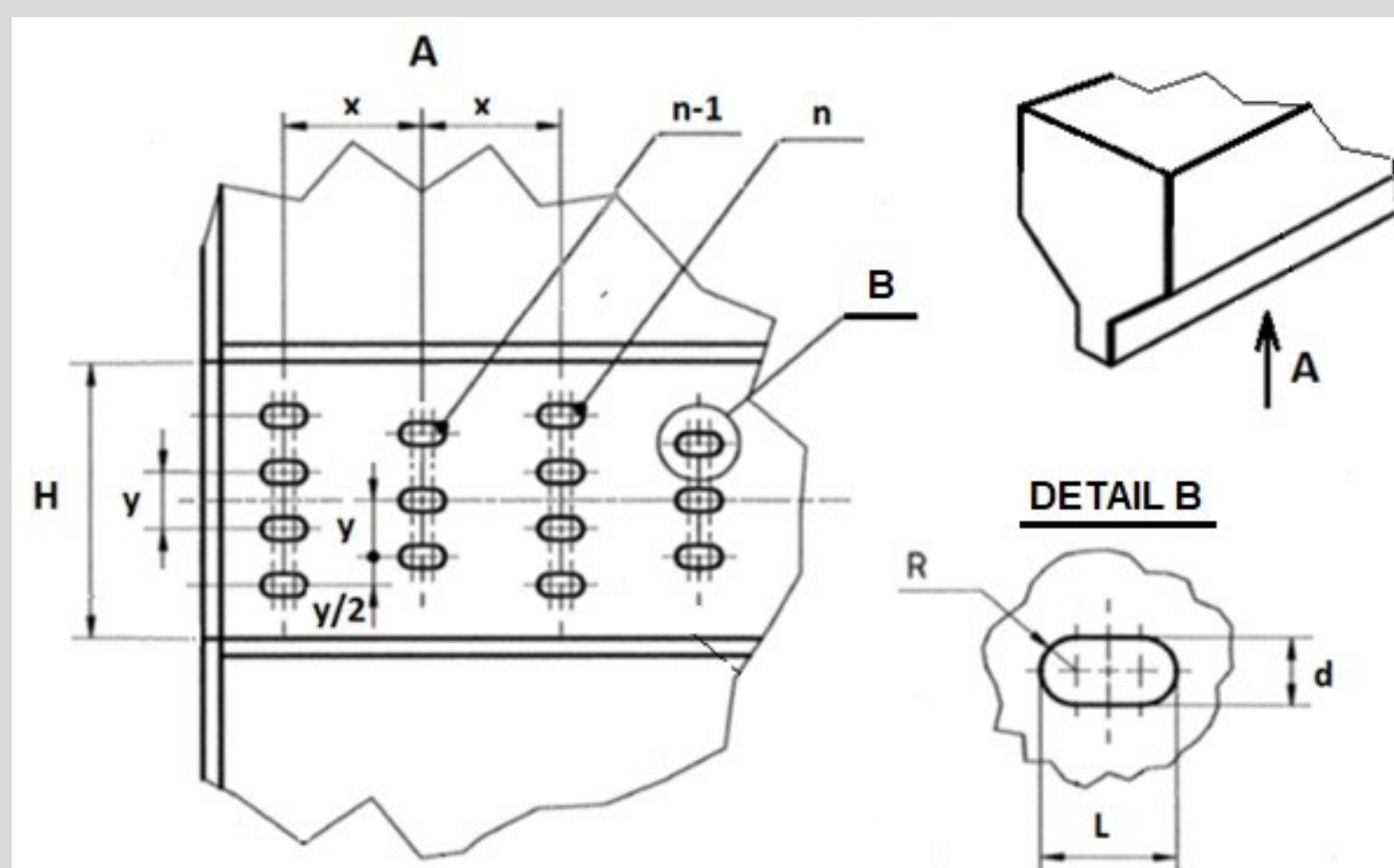
Rail heat treatment equipment

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Abstract:

The essence of the invention is a system of diffusers designed to cool rails at relatively low temperatures, however, at least 700 °C. The use of the invention does not require additional heating of the rails after the rolling process, while at the same time, when using the present invention, the rails have the desired structure after heat treatment due to the use of an air diffuser system provided with a grid with oval-shaped holes in the direction of the cooled rail according to the present invention, which ensures uniform rail cooling so that the desired hardness values are achieved, especially in the rail head (top) and in selected points of the cross-section. This is achieved by positioning diffusers for simultaneous cooling of the rail above and beside the rail head and also below the rail foot, which also prevents longitudinal twisting of the rail during cooling.

Detail of the diffusers with a grid of oval holes

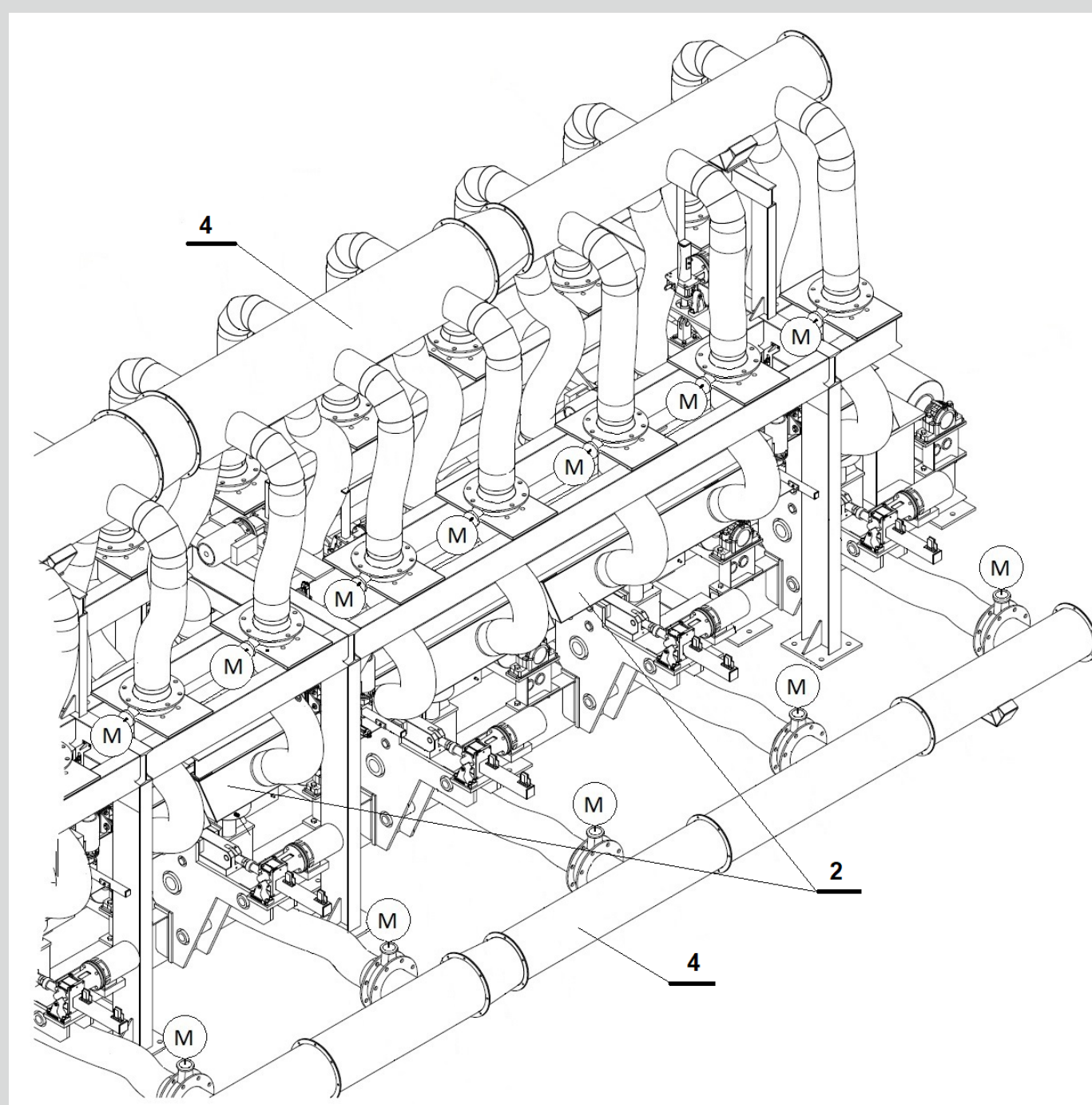
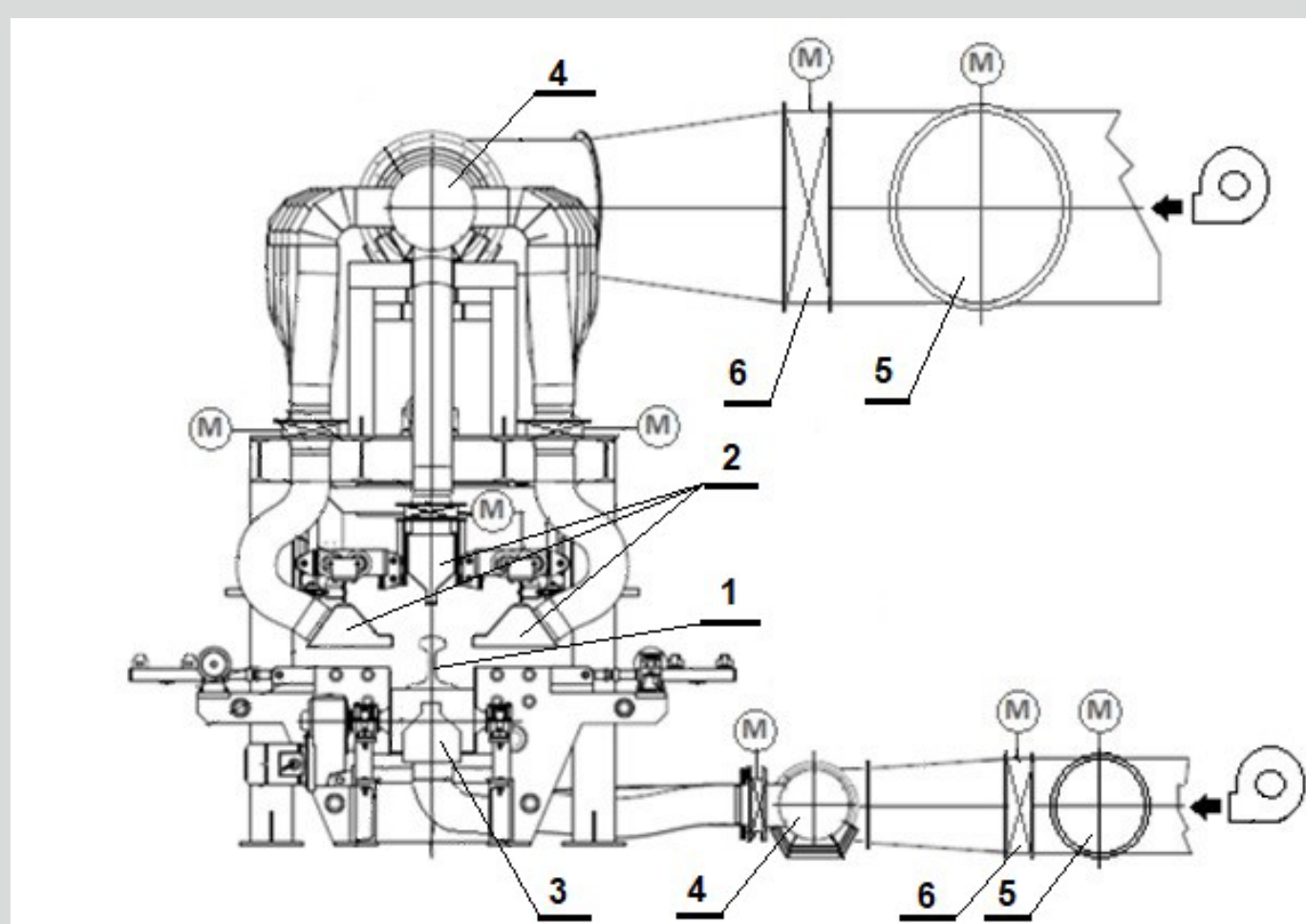


Description

After rolling the final rail profile on a rolling mill at a temperature of 700 °C to 900 °C, the rail is subjected to controlled cooling, so-called heat treatment, on the subject equipment to achieve a final microstructure with the desired surface hardness using the air diffusers according to the present invention. The uniform rail head cooling along the entire rail length in order to achieve the specified hardness levels at the top and at selected points of the cross-section is provided by a set of positionally adjustable air diffusers arranged above the running surface (top) and at the sides of the rail head, and also by a set of fixed diffusers installed under the foot of the rail. The cooling air distribution is provided by oval openings in the diffusers grille outlet facing the cooled surfaces of the head and foot of the rail. The diffusers are provided with a grille with oval holes arranged in parallel rows with alternating arrangement on the side of the cooled rail surfaces at the point of cooling medium discharge.

List of captions:

- 1 - Rail
- 2 - Diffusers for cooling rail head
- 3 - Diffusers for cooling foot of the rail
- 4 - Main air distribution duct
- 5 - duct branch with a control shut-off damper
- 6 - shut-off damper



Each of the two sets of diffusers is connected to a separate independent main air distribution duct with controlled distribution by remotely controlled throttle and shut-off valves, at the inlet of which a fan is installed. The main duct downstream of the fans features a built-in duct branch with a control shut-off damper, after which a functionally coupled auxiliary shut-off damper is located further downstream at a sufficient distance upstream of the backbone. The control system of these two dampers is used mainly in the start-up phase of the rail cooling process. During the supply of the rail placed on the roller conveyor to the position, the air flow through the pipe branches is temporarily diverted at full power of both fans (initial condition when the auxiliary shut-off damper is fully open and the shut-off damper of the main supply pipe is closed - this measure prevents the flow of cooling air into the diffusers). Only in the final phase of the subsequent diffuser positioning to the desired working position and fixing the rail by the adjacent positioning

device, a quick repositioning of both dampers occurs (end state when the auxiliary shut-off damper is fully closed and the main supply pipe shut-off damper is open - with this measure, a full flow of cooling air to the diffusers is already occurring with a short delay). In this way of operation, a full ramp-up of the cooling capacity is avoided before the desired working position of the rail and diffusers is secured.

The essence of the simultaneous cooling of the rail head and the rail foot is to ensure the dimensional stability of the rail without unwanted deformation, the position of which is adjusted and secured by a holding positioning device with extendable shaped rollers to prevent internal stresses in the rail during cooling.

