Lubrication-free piece for a railway device

This invention deals with the railroad sector of points and crossings and more specifically to the area of metal to metal friction surfaces of these devices such as to the area of friction surfaces which keep their lubricating properties durably.

Presently, in railroad systems such as switching devices, switches or frogs with movable point, with said devices presenting sliding or displacement between two metal pieces through friction of one against the other represent a problem of rapid wear and tear and seizure at the friction surfaces.

To correct these problems, it is common to grease surfaces in order to withstand friction between the different metal pieces. However, such greasing has some limitations such as that of having limited durability. The grease deposited onto the surfaces in contact is rapidly eliminated when using the device that has such surfaces. Beyond its mere removal, the grease also has the inconvenience of reacting or holding on to dust and particles of its operating environment. The lubricating properties of the grease are then altered at the expense of poor resistance when the surfaces are rubbing against each other.

An alternative solution to greasing consists in producing a friction surface from a layer of lubricating thermoplastic polymers, such as for instance, poly ether ether ketone. However, the deposit of such a polymer on a spheroidal graphite cast iron or steel surface has the downside of rapidly leading to the deterioration of the intrinsic lubricating features of the layer of polymers. For such a situation, a solution consists in using an intermediate amorphous steel layer to limit, or even to eliminate, such deterioration. However, if such solution presents an acknowledged efficiency, the addition of an intermediate amorphous steel layer is an operation that has the downside of having a consequential cost for the friction surface equipment.

The purpose of this invention is to remedy these downsides by proposing a solution at a lower cost than those of the prior state of the art that permits a surface suitable for durable metal to metal friction that operates with resistance strengths to movements with low values.

For that purpose, the invention concerns a piece or part comprising a surface that rubs against another, with this piece or part comprising at least a spheroidal graphite cast iron or steel with the external surface of the part having at least a layer of lubricating thermoplastic polymers,

CLAIMS

1. Piece or part comprising a friction surface (4) that rubs against a second surface, with this piece or part comprising at least a spheroidal graphite cast iron or steel structure (1), with the external surface (4) of the piece or part having at least a layer (3) of lubricating thermoplastic polymers characterized in that the piece or part comprises an nickel-aluminum based intermediate layer (2) between and in direct contact with the spheroidal graphite cast iron or steel structure (1) and the layer (3) of lubricating thermoplastic polymers.
2. Piece or part according to claim 1 characterized in that the surface of the spheroidal graphite cast iron or steel structure (1) onto which is arranged the nickel-aluminum based intermediate layer (2), produces a relief (5) that is at least partially filled by the nickel-aluminum based intermediate layer (2).
3. Piece or part according to any of claims 1 or 2, characterized in that since its structure (1) consists of spheroidal graphite cast iron, the nickel-aluminum based intermediate layer (2) produces an isolation of the spheroidal graphite particles.
4. Piece or part according any of claims 1 to 3, characterized in that at least a thermoplastic polymer comprises at least a thermostable semi-crystalline thermoplastic.
5. Piece or part according to any of claims 1 to 4, characterized in that at least a thermoplastic polymer comprises at least a polyether ether ketone.
6. Joint forming a sliding assembly characterized in that it comprises at least a piece or part having a friction surface (4) according to one of claims 1 to 5.
7. Treatment process of a surface of a spheroidal graphite cast iron or steel structure (1) for achieving a reduction of the friction resistance and obtaining a piece or part according to one of claims 1 to 5, characterized in that the treatment process includes at least:

    - a step for smoothing the surface to be treated;
    - a cleaning step of the smoothed surface;
    - a projection step of a nickel-aluminum based composition (2) onto the smoothed surface,
    - an impregnation or thermal spraying step of a liquid or powder thermoplastic polymer (3) onto the nickel-aluminum based surface (2).
    - a polymerization or finishing step by heating.

8. Treatment process of a steel surface according to claim 7, characterized in that the process comprises, also, prior to the aforementioned steps:

    - A degreasing step of the spheroidal graphite cast iron or steel surface,
    - A smoothing step of the spheroidal graphite cast iron or steel surface,