A multiple floor roadway tunnel has a circular wall and two horizontal slabs, one above the other and spaced apart to create three separate galleries within the tunnel. A service gallery is located between the bottom of the circular wall and the lower horizontal slab. A lower roadway gallery is located between the lower and the upper horizontal slabs. An upper roadway gallery is located between the upper horizontal slab and the top of the circular wall. Openings in the upper and lower slabs are located proximate the circular wall in spaced apart intervals and protected by fire devices of box type, which are connected by closed vertical access galleries for passage of people between galleries. The service gallery has at least one circulating shuttle vehicle, which may suspended from the lower horizontal slab, to allow for local access and the evacuation of people.
TUNNEL MULTI FLOOR

BACKGROUND OF THE INVENTION

[0001] 1. Field of the Invention
[0002] The present invention relates to the construction of roadway tunnels of circular cross-section, with two-way traffic, allowing for the creation of two independent and identical roadway galleries, for all kinds of traffic, and a service gallery interconnected with them, in order to provide local access for the personnel and the evacuation of people in case of accident or fire inside the tunnel.

[0003] 2. Background Art
[0004] The construction of roadway tunnels using tunnel boring machines is a solution increasingly used, for both economic and environmental reasons. With this technique, the boring machine excavates soil, and inserts precast segments, in order to form the wall of the tunnel, which becomes circular shaped. Subsequently, a lining on the bottom of the tunnel is executed in order to create a platform for the circulation of vehicles, with the two-way traffic placed side by side.
[0005] In current tunnels with more than one lane in each way, the diameter required is unacceptable for the existing tunnel boring machines. Furthermore, in the case of long tunnels, the existing tunnels are also problematic because it is necessary to built two separated tunnels, one for each way of traffic because of safety reasons.
[0006] Reference WO2004094785 refers to a circular tunnel with two independent roadway galleries, one for each way of traffic. However, the galleries are much different and it will still be necessary to build a second separated tunnel.
[0007] Reference EP 1191186A1 refers to a circular roadway tunnel with two levels provided with separating walls, but each level carries a single lane in each way, and the upper level only allows for the traffic of passenger cars.

SUMMARY OF THE INVENTION

[0008] A multiple floor roadway tunnel of circular cross section is provided, with the two directions of traffic separated by having two slabs extending across the tunnel’s width, one placed roughly at the half height of the tunnel and the other placed slightly above the bottom of the tunnel, in order to create three overlapping galleries, isolated and independent: two identical roadway galleries, one for each way of traffic, and a service gallery.
[0009] The slabs have openings, placed close to the circular wall of the tunnel, in one or in both sides of the tunnel, regularly spaced and protected with fireguard devices of box type, which are connected through closed vertical access galleries, to allow for safe passage of people between the roadway galleries and the service gallery.
[0010] The service gallery is provided with emergency vehicles of shuttle-type, circulating throughout and may suspended from above, to allow for the access of personnel and the evacuation of people in case of accident or fire inside the tunnel.

BRIEF DESCRIPTION OF THE DRAWINGS

[0011] FIG. 1 is a perspective sectional view of the multiple floor tunnel.
[0012] FIG. 2 is a cross-sectional view of the multiple floor tunnel.
[0013] FIG. 3 is a cross-sectional view of the multiple floor tunnel through a vertical access gallery.
[0014] FIG. 4 is a longitudinal cross-sectional side elevational view of the multiple floor tunnel.
[0015] FIG. 5 is a cross-sectional top plan view of the upper roadway gallery of the multiple floor tunnel.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT(S)

[0016] A tunnel boring machine excavates soil and places precast segments, which are clamped together, in order to form the wall of the tunnel 1, which is circular shaped.
[0017] Referring to FIGS. 1-5, inside of the tunnel 1 two slabs 2, 3 are executed, along the full width of the tunnel, one placed roughly at half the height of the tunnel and the other placed slightly above the bottom of the tunnel. This creates three isolated and independent galleries, one on top of another: two substantially identical roadway galleries 4, 5, one for each way of traffic, and a service gallery 6.
[0018] On the slabs 2 and 3, openings 7 will be arranged, placed close to the circular wall of the tunnel 1, in one or in both sides of the tunnel. The openings will be regularly spaced, protected with fireguard devices 8 of box type, which will be provided with escape doors. The fireguard devices 8 are located on both slabs 2 and 3, and are connected through closed vertical access galleries 10, which are provided with interior stairs, in order to allow for safe passage of people between the roadway galleries 4, 5 and the service gallery 6. The vertical access galleries 10 can be extended through the circular wall of the tunnel 1.
[0019] Inside the service gallery 6, emergency vehicles of shuttle type 9 are installed, which may suspended from the slab 3. The shuttle emergency vehicles 9 circulate throughout the service gallery 6 of the tunnel to provide local access of personnel and the evacuation of people in case of accident or fire inside the tunnel.
[0020] While embodiments of the invention have been illustrated and described, it is not intended that these embodiments illustrate and describe all possible forms of the invention. Rather, the words used in the specification are words of description rather than limitation, and it is understood that various changes may be made without departing from the spirit and scope of the invention.

What is claimed is:

1. A roadway tunnel defined by a circular wall, the tunnel comprising:
   a lower horizontal slab located above the bottom of the circular wall;
   an upper horizontal slab located above the lower horizontal slab and below the top of the circular wall;
   a service gallery located between the bottom of the circular wall and the lower horizontal slab;
   a lower roadway gallery located between the lower horizontal slab and the upper horizontal slab,
   an upper roadway gallery located between the upper horizontal slab and the top of the circular wall, and
   openings in the upper and lower slabs located proximate the circular wall in spaced apart intervals, protected with fire devices of box type, which are provided with escape doors.

2. The tunnel according to claim 1 wherein the fireguard devices on the lower and the upper roadway galleries are connected by closed vertical access galleries to allow for safe
3. The tunnel according to claim 1 wherein the service gallery is provided with at least one circulating shuttle vehicle, which may be suspended from the lower horizontal slab, able to allow for local access and the evacuation of people.

4. The tunnel according to claim 1 wherein the lower horizontal slab is located slightly above the bottom of the tunnel.

5. The tunnel according to claim 1 wherein the upper horizontal slab is located roughly at half the height of the tunnel.

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