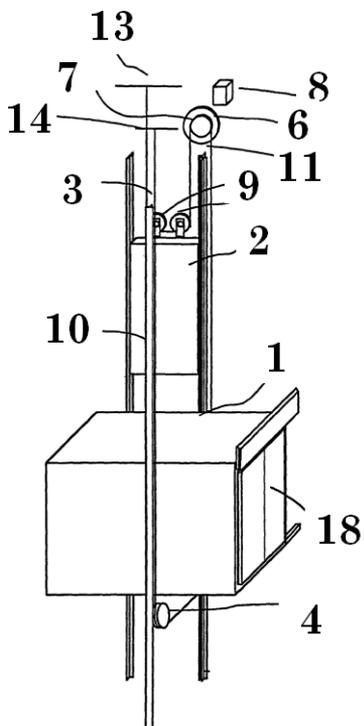


13 located in the upper part of the shaft above the path of a counterweight 2 moving along counterweight guide rails 11. From the anchorage, the ropes run downward and are passed around diverting pulleys 9 suspending the counterweight, which diverting pulleys 9 are rotatably mounted on the counterweight 2 and from which the ropes 3 run further upward to the traction sheave 7 of the drive machine 6, passing around the traction sheave along rope grooves on the sheave. From the traction sheave 7, the ropes 3 run further downward to the elevator car 1 moving along car guide rails 10, passing under the car via diverting pulleys 4 used to suspend the elevator car on the ropes, and going then upward again from the elevator car to an anchorage 14 in the upper part of the elevator shaft, to which anchorage the second end of the ropes 3 is fixed.

Anchorage 13 in the upper part of the shaft, the traction sheave 7 and the diverting pulley 9 suspending the counterweight on the ropes are preferably so disposed in relation to each other that both the rope portion going from the anchorage 13 to the counterweight 2 and the rope portion going from the counterweight 2 to the traction sheave 7 are substantially parallel to the path of the counterweight 2. Similarly, a solution is preferred in which anchorage 14 in the upper part of the shaft, the traction sheave 7 and the diverting pulleys 4 suspending the elevator car on the ropes are so disposed in relation to each other that the rope portion going from the anchorage 14 to the elevator car 1 and the rope portion going from the elevator car 1 to the traction sheave 7 are substantially parallel to the path of the elevator car 1. With this arrangement, no additional diverting pulleys are needed to define the passage of the ropes in the shaft. The rope suspension acts in a substantially centric manner on the elevator car 1, provided that the rope pulleys 4 supporting the elevator car are mounted substantially symmetrically relative to the vertical center line passing via the center of gravity of the elevator car 1.

The drive machine 6 placed in the elevator shaft is preferably of a flat construction, in other words, the machine



Pat. 9,573,792

Figure 24: Diagram representing a traction sheave elevator.

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has a small depth as compared with its width and/or height, or at least the machine is slim enough to be accommodated between the elevator car and a wall of the elevator shaft. The machine may also be placed differently, e.g. by disposing the slim machine partly or completely between an assumed extension of the elevator car and a shaft wall. The elevator shaft can be provided with equipment required for the supply of power to the motor driving the traction sheave 7 as well as equipment for elevator control, both of which can be placed in a common instrument panel 8 or mounted separately from each other or integrated partly or wholly with the drive machine 6.

The drive machine may be of a geared or gearless type. A preferable solution is a gearless machine comprising a permanent magnet motor. The drive machine may be fixed to a wall of the elevator shaft, to the ceiling, to a guide rail or guide rails or to some other structure, such as a beam or frame. In the case of an elevator with machine below, a further possibility is to mount the machine on the bottom of the elevator shaft. Figure 24 illustrates the economical 2:1 suspension, but the invention can also be implemented in an elevator using a 1:1 suspension ratio, in other words, in an elevator in which the hoisting ropes are connected directly to the counterweight and elevator car without diverting pulleys. Other suspension arrangements are also possible in an implementation of the invention. The elevator presented in the figure has automatic telescoping doors 18, but other types of automatic doors or turning doors can also be used in

continued on next page