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Figure 7: Elevation view of the bumper housing a winch-cable system.

or 14, guides 13 and 15 are positioned about the pulleys, respectively. From winch drum 16, cable 26 extends across the axial length of bumper 2 to pulley 12, further extending to pulley 14, and then to swivel-sheave 25 from which cable 26 with hook 24 attached hangs free for use. In the embodiment illustrated, the winch system is powered by hydraulics, but could just as well be powered using mechanical, electric, pneumatic, or internal combustion drives. The type of power chosen does not change the principles of the invention and all such power sources, including solar and others not so identified, but suitable, are contemplated for use with the invention.

When a vehicle requires recovering, the recovery vehicle fitted with a remotely controlled, hydraulically-powered winch system following the principles of the present invention is positioned with respect to the vehicle being recovered and the remotely controlled, hydraulically-powered retractable recovery stabilizing system 40 is put into place to level and stabilize the recovery vehicle. This step increases operator safety and protects against unwanted motion of the recovery vehicle. Even if the recovery vehicle can not be oriented in all possible positions with respect to the vehicle to be recovered, swivel sheave pulley 25 can be swiveled so that the vehicles are effectively oriented with respect to each other.

In order to attach the recovery winch cable to the object being recovered, cable 26 is played out from the winch drum so that it first is wound around pulley 12 and then about pulley 14. The pulleys change the direction of the applied force, transmit rotational motions, and/or realize a mechanical advantage in either or both linear and rotational motion to provide for an even winding of the cable on the drum. The use of more than one pulley provides for maximum redirection of the pulling force to enhance even-winding of the cable on the drum. Moreover, the positioning of the pulleys and the winch relative to one another provides the cable length required for maximum control of cable movement and orientation. Cable 26 is then oriented about horizontal-axis, grooved, swivel-able sheave 24 providing direction-changing freedom of motion to the sheave. Thus, the swivel-able connection provides for the recovery vehicle to use the winch to recover an object regardless of the position of that object in relation to the recovery vehicle.

This means that the previously required positioning and repositioning of the recovery vehicle in order to maintain the object to be recovered in perfect perpendicular alignment with the recovery bumper is no longer required. Protecting the bumper from damage when it is used to push an object being recovered is rubber padding 60 permanently attached to the bumper. To provide access to the winch hook and cable, the rubber padding is provided with an opening over the cavity that is housing the cable hook, cable end, and sheave. Optional cover plate 35, which in this example is hingedly attached to bumper 2 using hinges 32 for easy and rapid

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