“ALL SAFE, GENTLEMEN” ?

As we look around the world of today, one can marvel at the work ethic and geniuses of mankind. Monuments to those geniuses include the likes of The Empire State Building, The World Trade Center, The Sears Towers, The Petronas Towers, and The Burj Khalifa of Dubai.

But just think....none of this would be possible without the elevator, and in fact, without the **SAFE** elevator.

Elisha Graves Otis is credited with inventing the **SAFE** elevator. At the Crystal Palace Exhibition, in 1853, he demonstrated his down-direction safety by standing on a platform, raising the elevator with a rope, and then ordering the rope cut. The crowd roared their approval night after night as Otis removed his hat and exclaimed: **“ALL SAFE, GENTLEMEN, ALL SAFE”.**

Since that day, elevator codes around the world have been constantly updated in an effort make elevators safer with improvements that require car door unlocking zones (ASME A17.1/CSA B44, and EN81), inspection operation with opened doors (A17.1/B44), redundancy and checking of electrical protective devices (A17.1, B44, EN81) and in addition to the down-direction safety, ascending car overspeed protection (ACO) and protection against leaving the floor with opened doors (A.17/B44/EN81), (Unintended Car Motion, UCM).

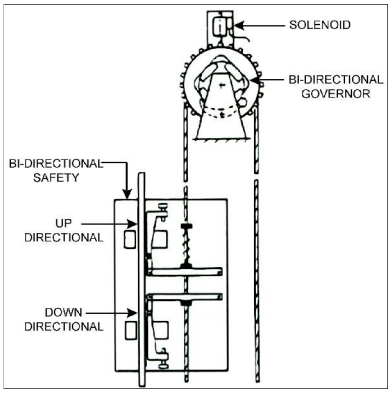

Figure 1. Bi-directional safety

In the event that an elevator stops between floors, the unlocking zone device prevents passengers from exiting an elevator, but allows them safe exit near the landing (A17.1/B44/EN81).

Hoistway access switch operation allows the slow speed running of a car down from the top floor, or up from the bottom floor with open doors. This allows easy access to the top of the car and overhead, or the bottom of the car and pit (A17.1/B44).

Circuits are also required to allow car top, or in-car inspection operation while bypassing car door and/or hoistway door circuits (A17.1/B44). This requirement is safer than the alternative of physically bypassing (jumping) car and/or hoistway door circuits, to run the car for maintenance purposes. Too many times forgetting those jumpers has led to disastrous consequences by allowing the elevator to run on automatic operation with opened doors.

In this writer’s opinion, passenger safety in the U.S. and Canada improved by leaps-and-bounds with the adoption of the ASME A17.1-2000/CSA B44 in 2000, and in Europe with the adoption of the EN81-1, 2009A3.

The most important feature of these codes are the redundancy and checking requirements, coupled with ascending car overspeed (ACO) protection and protection against leaving the floor with the doors open (Unintended Motion Protection - UCM).

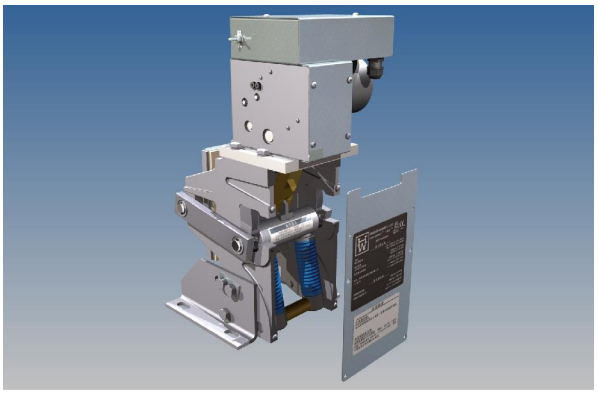

Figure 2 620G geared Rope Gripper

In the simplest form of checking, when the car door is open, the car door contact and hoistway door contact must also be opened. If either or both are made, a fault is detected preventing automatic elevator operation. With redundancy, two separate control inputs can be utilized. If both circuits do not operate simultaneously, a fault is detected, and automatic operation is prevented.

The early requirement in the EN81 Code was only for ascending car overspeed (ACO) protection. This was accomplished with manual rope brakes in China and bidirectional Safeties in Europe. Both were strictly mechanically activated by newly designed Governors. When unintended car motion (UCM) is required along with ACO protection, as in the U.S., Canada, and the latest EN81, these devices became somewhat impractical, either activating during a power failure then requiring manual reset, or using battery backup to prevent activation and to monitor the possibility of ACO and UCM.

Although a Sheave Jammer (Brake) was used with limited success, a Rope Brake, called The Rope Gripper® is the main product used for the A17/B44 requirements, and during a power failure will simply stop the elevator without damage to the ropes, and when power is restored, place the elevator back in service. Of course, if an actual fault occurred, the circuits would require a mechanic's intervention to fix the problem and reset the Rope Gripper®.

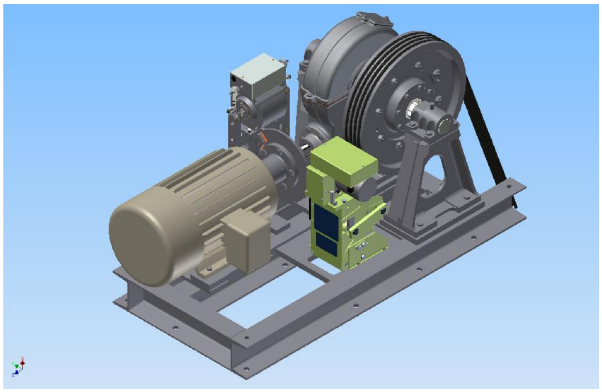

Figure 3 Geared traction machine with pre-mounted 620G Rope Gripper

The Rope Gripper® is basically a "dumb" device relying on another means for its operation. In Canada and the U.S., the control manufacturers have been dealing with the circuits to activate and reset the Rope Gripper® for years. This appears to be the best and least expensive method because the control system knows exactly what the elevator is doing and can easily detect a fault. The addition of inputs, outputs and software adds very little expense.

Many European manufacturers have decided to supply separate panels to activate their emergency brakes (Sheave Brakes, Bi-direction Safeties, Rope Brakes, etc). While this may be easier in the short run, it is more expensive and does not provide as much flexibility. It does,

however, make it easier to add these devices to an existing installation. GAL/H-W will also have available a similar device. In addition to redundancy and checking of door functions, the device is easily installed on existing elevators and along with a Rope Gripper®, protects against ACO and UCM.

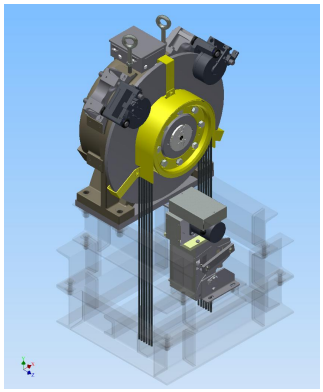

Figure 4 Rope Gripper pre-mounted on PMAC machine

Those in our industry who are part of the various code making bodies are to be congratulated. They have noticed some areas where it is absolutely necessary to improve safety, and they have done so. The riding public is safer due to their diligence.

I believe, however, that knowing what we know about these dangerous situations, they have not gone far enough. A17.1, B44, and EN81 are codes that apply only to new elevators, which are less likely to display these dangers. Our code writers have effectively shut the barn door, but the horse is already out. It is the older elevators that represent the largest potential for accidents. I believe that a good case might be made that the older an elevator is, the more likely it is to display these problems.

I understand the difficulties of writing requirements that are retroactive, but in the case of firemen service it has been done before. If our industry truly has the safety of the riding public at heart, we could and should have a much bigger effect by making protection for at least door circuits, ACO and UCM, mandatory for all elevators. This is an especially important concept for elevators because of their long life expectancy. The riding public expects elevators to always be safe. Our requirements should meet their expectations.

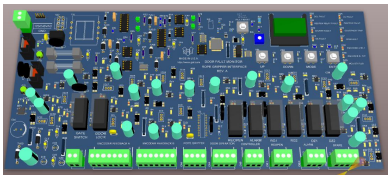

Figure 5 Door Lock Monitor Rope Gripper panel

About the Author:

Walter Glaser, Vice President of G.A.L. Manufacturing Corp. and Hollister-Whitney Elevator Corp. a 50-year industry veteran, is active in the everyday management of both companies. With a background in electrical and mechanical engineering, Glaser has been involved in many product designs and has many international patents to his credit.

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