from the series *Design for Safe Habitat*

Safe Doors • • • Garage Doors

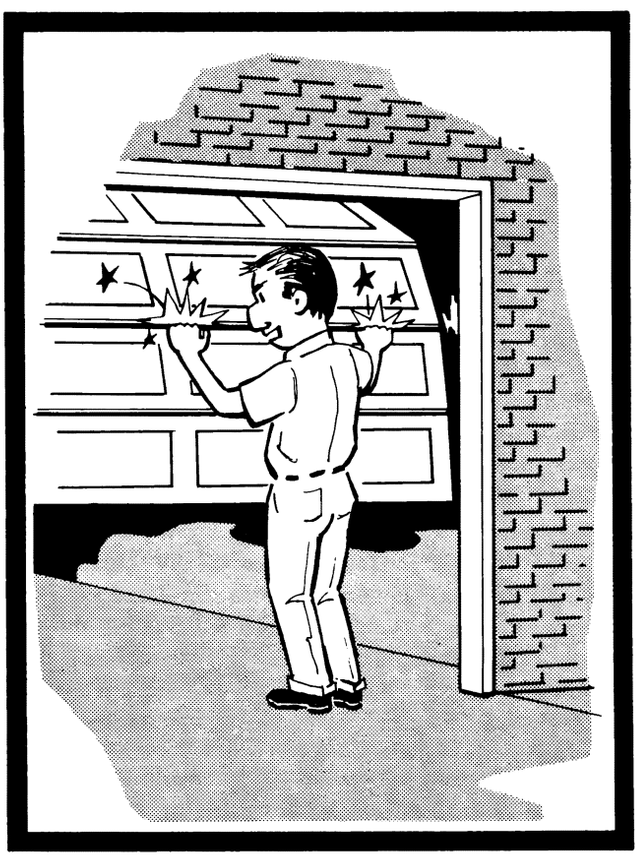
Most garage doors in residences employ a counter-balancing system for ease of operation and to allow the door to hold in a desired fixed position. These counter-balancing mechanisms are usually composed of springs or a combination of springs and cables. Failure of these components can result in injury to the individual nearby who may be struck by a metal part that has been rapidly projected in his direction. The sudden relaxing of spring tension as the door is actuated may result in a crushing injury as the door falls down onto the individual's feet or body.

Most garage-door counter-balancing devices employ the use of two long coil springs; one on each side of the door. The greatest failure potential in these installations exists in those spring configurations which employ the use of a hook-shaped bend in the spring end as an attaching device. The forming process induces a concentration of stresses in the hook, which results in fatigue and probable early failure at that point.

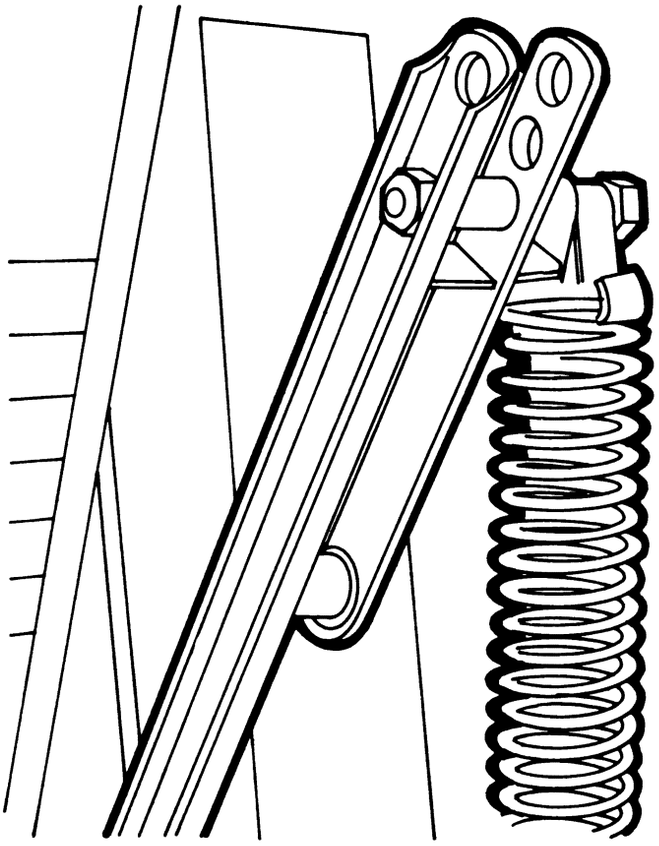
A clip device designed for a straight tension load, inserted between the first two coils of the spring, can effectively reduce breakage at the end of the spring. The probability of failure in the main portion of the spring is remote, and, when it does occur, the spring merely collapses to its static state, although it may move about in a localized area. Covers and containing devices are available to contain the spring and prevent this occurrence. Similar containing devices are available for use with spring and cable systems.

Sectional garage doors present an additional hazard unique to their design, i.e., the probability of suffering crushed fingers between the hinged section as the door is being moved to the closed position. The door handle is usually located at the bottom of the door, and, rather than bend down to completely close the door, most individuals prefer to reach up and grasp an exposed section edge to apply downward pressure. As the door moves down to the

Garage door spring failure is the cause of many home injuries.



Human error in operating sectional garage doors results in many crushed-finger accidents.



Safety clips on garage-door counter-balance springs reduce the probability of breakage at the attachment point.

closed position, the fingers are crushed between the opposing edges of the two sections as they close.

Several alternatives that might correct this hazard, in the manufacturing phase, are not employed at present. The installation of a handle at the bottom of each door section would discourage the temptation for individuals to place their fingers between the sections. The top and bottom edges of folding garage door sections could be grooved to permit safe closing and to provide an integral grasping feature. This type of closure might also employ a soft, resilient weatherstripping material which would act as a safeguard against crushed fingers.

Automatic, electrically-operated garage doors may present an attractive hazard to children who see them as a device for play. Since the doors require electrical current as their source of operating power, the hazards associated with electricity are also present. Electrically-actuated garage doors should be equipped, as are elevator doors, with a reversing device, so that when obstructed on the downward cycle, they will automatically reverse themselves and avoid a crushing injury. All electrically-actuated garage doors should bear the seal of approval of the Underwriters Laboratory, or other recognized testing agencies.

RECOMMENDATIONS:

Alternatives and means by which to improve the safety feature of residential garage doors are as follows:

- **The large counter-balancing springs on both sides of garage doors shall utilize a safety-clip device designed for tension load attachment rather than spring ends formed into a hook for attachment purposes.**
- **A means of containing the spring or spring-and-cable counter-balance mechanism shall be used to prevent injury in the event of failure.**
- **A handle shall be placed at the bottom edge of each section of sectional garage doors.**
- **Electrically-operated garage doors shall include an automatic self-reversing circuit which actuates itself when an obstruction is encountered by the door in operation.**
- **Electrically-operated garage doors shall bear the seal of approval of the Underwriters Laboratory, or other recognized testing agencies.**

Before building, consult the BOCA code.

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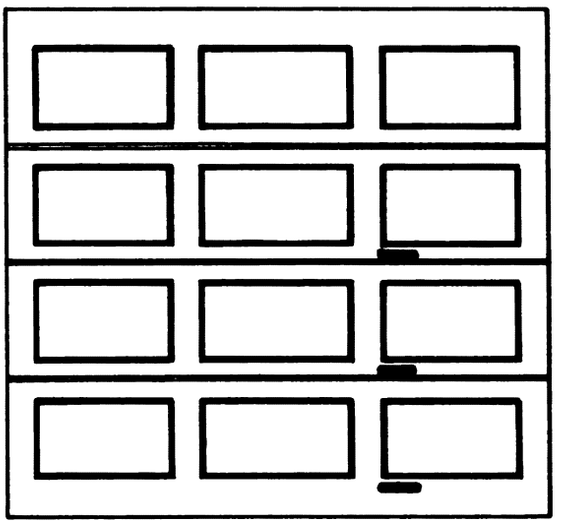
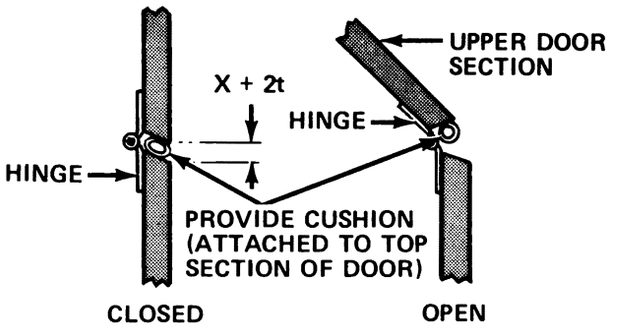
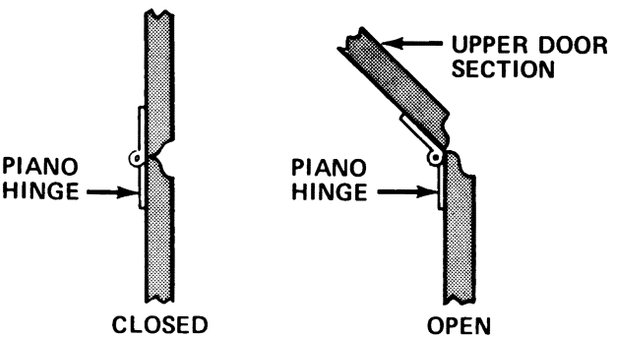


SECTIONAL OVERHEAD GARAGE DOORS SHALL BE EQUIPPED WITH A "PULL" OR HANDLE ON AT LEAST THE BOTTOM THREE SECTIONS ON OUTSIDE OF THE GARAGE DOOR.

"X" - THICKNESS OF 95th PERCENTILE MALE FINGER
"t" - THICKNESS OF CUSHION WALL





Sectional garage doors should be protected with devices to avoid crushed finger accidents.