PURPOSE

Describes the Weston Brake, including its operation.

SCOPE

Based on the Weston Brake in Harrington's CB handchain operated chain hoist.

DESCRIPTION

The Weston Brake is the single most important invention in the hoisting industry. It was invented by Thomas Weston in the late 1800's, and it is a fundamental element of almost all manually operated hoists, and many electric hoists.

Figure 1 is a schematic representation of the drive train for the Harrington CB hoist.

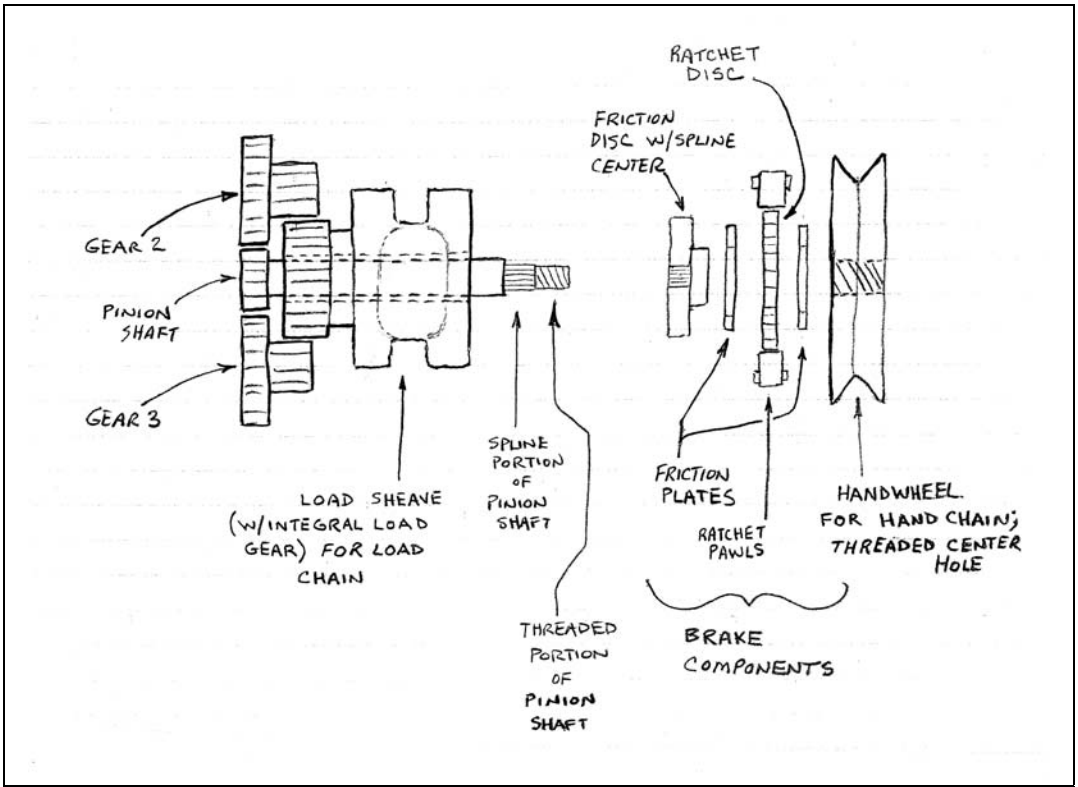

Fig 1 – Drive Train Schematic, Harrington CB Hoist

The Weston Brake portion is comprised of the parts identified as Brake Components, namely:

(1) Friction Disc with splined center hole
(2) Friction Plates
(3) Ratchet Disc
(4) Ratchet Pawls
(5) Handwheel with threaded center hole

OPERATION

When the Handwheel (1) is rotated in the "up" direction for lifting the load:

(a) The threaded center hole of the Handwheel (1) causes it to screw tightly onto the threaded portion of the Pinion Shaft. This squeezes Brake Components (1) through (5) tightly together. The Friction Disc (1) is splined to the Pinion Shaft, and this transmits the rotational movement of the Handwheel to the Pinion Shaft.

(b) The Pinion Shaft, which runs through a hole in the center of the Load Sheave, engages the reduction gears (Gear 2 and Gear 3). Rotation of the Pinion Shaft is transmitted through the reduction gears to the geared portion of Load Sheave. when the Load Sheave rotates, it causes the hoist's load chain to move, which lifts the load attached to the hoist's bottom hook.

When rotation of the Handwheel (1) ceases for holding the load:

(c) Gravity acting on the load pulls on the Load Chain, which tries to cause the Load Sheave to rotate in the lowering direction. This rotational torque is transmitted through the gears to the Pinion Shaft and keeps the Brake Components (1) through (5) squeezed tightly together. As the entire assembly tries to rotate backward, the Ratchet Pawls engage the Ratchet Disc, which prevents the load from lowering.

When the Handwheel (1) is rotated in the "down" direction for lowering the load:

(d) The threaded center hole of the Handwheel (1) causes it to back off the threaded portion of the Pinion Shaft. This decompresses the Brake Components (1) through (5), and allows the Pinion Shaft and gears to rotate backward in the lowering direction in response to the action of the falling load. But, as the load begins to fall, the backward rotational speed of the Pinion Shaft overtakes the rotational speed of the Handwheel (1). This causes the threaded center hole of the Handwheel (1) to tighten up the Brake Components (1) through (5) again and the lowering of the load is stopped. As the Handwheel (1) continues to be rotated in the "down" direction this loosening and tightening of the Brake Components (1) through (5) results in a series of very small controlled load falls, which is perceived as one smooth lowering motion.

END