

24—Materials Handling and Storage

the normal curvatures are maintained. This normally curved spine is termed a "straight back."

With "straight back lifting" the spine is fairly rigid (nonmedically speaking) and the pressure on the lumbar intervertebral disks is evenly distributed. When lifting with the back bent, the spine forms an arc with the result that the lower back muscles are subject to strain and there is uneven pressure on the disks.

In addition to the risk of intervertebral disk lesions, lifting an object with the back bent and the legs straight imposes excessive stress on the muscles of the back for two reasons. First, the back must be inclined at a greater angle to the vertical for the hands to reach the object. Since the "effective weight" (of the object plus the upper part of the worker's body) increases rapidly as this angle is increased, a much greater effort is required to raise the back to its vertical position. Second, muscular effort is required to "straighten" the spine.

When a weight is being lifted from the ground, making maximum effective use of the legs, the back is straight but inclined forwards. As the lift proceeds by the extension of the knees, the back returns to the vertical position.

The position of the feet and the flexion of the knees are the key factors for maintaining a straight back.

Arms close to the body. When lifting and carrying weights, the arms should be close into the body and remain straight whenever possible. This is because flexing the elbows and raising the shoulders imposes unnecessary strain on the muscles of the upper arms and chest.

Carrying involves a static posture of the arms, and particularly in the case of long distances, any assistance given by the body in supporting the weight will lessen the tension in the muscles. Carrying with the arms straight enables the weight to rest against the thighs.

Correct hold. An insecure grip may be due to taking the load on the finger tips, thus creating undue pressure at the ends of the digits and strain to certain muscles and ten-

dons of the arm. Greasy surfaces often prevent a secure hold—whenever possible such surfaces should be wiped clean. The use of suitable gloves should also be considered.

A full palm grip will reduce local muscle stress in the arms and decrease the possibility of the weight slipping.

Chin in. Raising the top of the head and tucking the chin in straightens the whole spine, not merely the neck. This automatically raises the chest and conditions the shoulders for more efficient arm action. See illustrations on previous page.

This chin-in action should be introduced immediately before lifting and maintained throughout the movement. The worker will be looking down at the early stages of the lift and this may conflict with his desire to raise his head to see where he is going. However, as he returns to the upright position, his head will automatically be raised at the same time.

Use of bodyweight. With the correct positioning of the feet and the flexion and extension of the knees, the weight of the body can be effectively utilized to push and pull objects and to initiate a forward movement such as placing an object on a shelf or walking.

When lifting an object from the ground, the thrust from the back foot, combined with the extension of the knee joints, will move the body forwards and upwards and for a brief period it will be off balance. This is immediately countered by bringing the back leg forward, as in walking, but by this time the lift is completed. This forward movement of the body results in a smooth transition from lifting to carrying.

Here are some techniques for specific situations.

- 1 If the object is too large or too heavy to be handled by one person, he should get help.
- 2 Before lifting the load to be carried, the worker should consider the distance to be traveled and the length of time he will have to maintain the grip. He should recognize the fact that his gripping power may tire if he has to carry the load a long distance, especially if he has to climb stairs or ramps.