

# The Canadian Engineer

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## HANDLING MATERIALS BY BUCKET CARRIERS

THE "ONE-PIECE" SYSTEM FOR ELEVATING AND CONVEYING—TYPES, CAPACITIES, ECONOMIC SPEEDS, HORSE-POWERS—ADVANTAGES AND DISADVANTAGES\*

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ALL conveying and elevating apparatus so far discussed has had one and the same limitation; that is, each particular type of equipment has been destined for practically but one operation, either that of conveying in a more or less horizontal plane or else elevating more or less vertically. From a purely economic standpoint such limitation is actually an advantage, for the use of a separate and distinct equipment for each main operation is frequently advisable, particularly in installations where the various operations of conveying and elevating must of necessity be continuous. A breakdown in an elevator or conveyer would then not necessarily mean a shutdown, for some temporary makeshift—possibly manual handling of the load—could be resorted to for carrying past the damaged conveyer or elevator and the balance of the operations performed as ordinarily. However, one apparatus for performing both operations of elevating and conveying has the advantage of simplicity and, though a breakdown anywhere in such equipment must necessarily mean a complete shutdown of the entire conveying and elevating system while repairs are made, this more flexible outfit is frequently installed in preference to the more reliable but more complex systems in which the various main operations are performed by individual apparatus. The "one-piece" system frequently possesses the advantage of lower initial cost, and further, the advantage that material may be carried in either direction. For elevating, the "one-piece" system necessitates a succession of buckets, somewhat similar to those of the bucket elevator, and the conveying operations must necessarily be performed by the same buckets. The apparatus is commonly designated as a "bucket carrier," both to distinguish it from a bucket elevator and because such equipment can be, and is sometimes, used to carry material only in a horizontal plane or in an inclined plane.

**Classification and Construction.**—Two distinct types of bucket carriers are in general use—those in which the buckets are rigidly attached to the endless carrying chains so that on horizontal stretches the buckets act as do the flights of flight conveyers and drag the load along a trough; and those in which the buckets are suspended from the carrying chains so that they maintain an upright position in whatever plane they may be advancing. The latter type of bucket carriers, those with pivoted buckets, require discharging devices which tip the buckets so that their load may be discharged at a specified point. This limits the distributing capability of the pivoted bucket carrier, for but one discharge point is all

that is possible without greatly complicating the equipment—that is, only one discharge point without shifting the discharging, bucket tipping, device. The annoyance and inconvenience of frequently shifting the discharging device may be somewhat reduced by the installation of systems of distributing chutes, etc. The pivoted bucket construction also complicates the loading of the carriers to some extent, as they are nearly invariably loaded on a horizontal stretch of carrier, in order to avoid the necessity and complication of a receiving receptacle similar to an elevator boot employed for bucket elevators. The carrier's buckets must then be proportioned so that, on horizontal stretches, there may be no gaps between buckets—only possible when the buckets are provided with lips that extend from one bucket over the edge of the succeeding bucket—or else the bucket carrier must be provided with a reciprocating feeder that delivers load to the carrier only when the succeeding buckets are each in the proper position for receiving their load. Rigid bucket carriers, on the other hand, may be loaded as steadily and uniformly as a flight conveyer.

The construction of bucket carriers permits them to run in almost any conceivable path provided the buckets always lie in the same vertical plane. That is, the elevation of the bucket carrier path may be rectangular, a series of steps with the return run of buckets in a series of descending steps or, as is more common, with the buckets brought down vertically from the end of the carrier travel in the first general direction to the plane of the loading point and thence in a more or less horizontal path to the point where the general direction of advance is upward, etc., etc. Bucket carriers traveling in rectangular paths are the more common and are also the more convenient in that one load can be elevated and then carried horizontally to the desired discharge point while a second load can be carried over the lower horizontal run, elevated and discharged where desired. This type of carrier is frequently installed in power houses where coal is elevated and discharged to coal bunkers by the forward run of buckets and the return run of buckets is employed to carry the ashes from under the grates and discharge to an elevated ash bin from which they may be subsequently removed by other means.

Bucket carriers can, of course, be equipped with buckets of almost any conceivable size and shape, but practice has standardized a rectangular shape with a

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