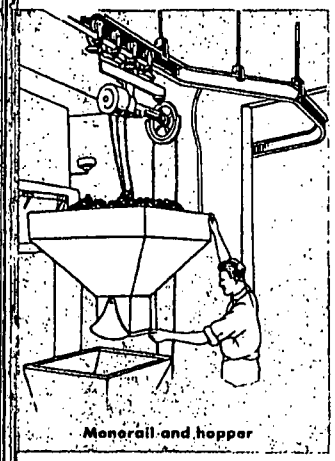
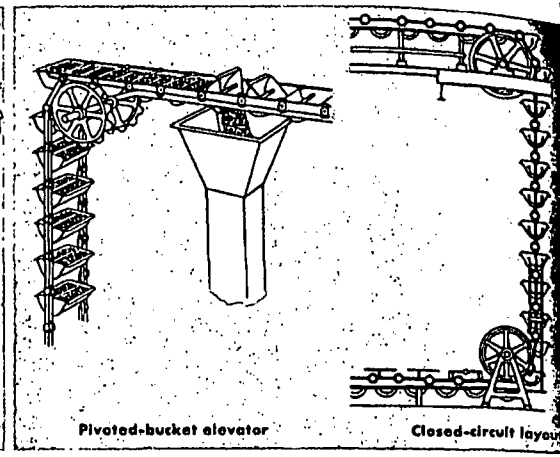
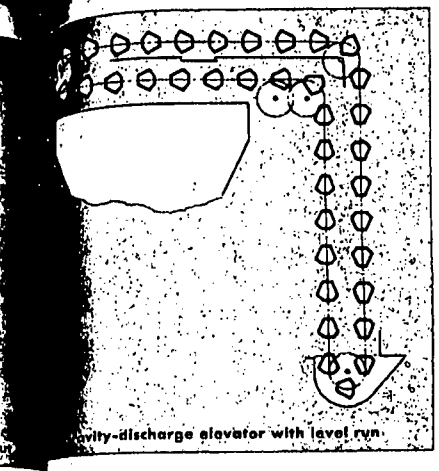


Monorail and hopper



Pivoted-bucket elevator

Closed-circuit layout



Gravity-discharge elevator with level run

MONORAILS, BUCKET CARRIERS, BELTS

Some idea of the wide variety of conveying equipment can be gained by looking at designs illustrated here, plus those on the preceding page. Here we have, *left*, the monorail carrier, used in smaller plants for essentially horizontal distribution, from bin to stoker hoppers, for example.

The pivoted-bucket or Peck carrier, *above*, serves equally well for vertical and horizontal runs. It was once extensively used in a closed-circuit arrangement, distributing coal to bunkers or hoppers along the top run and handling ash removal on the bottom run. Gravity-discharge bucket elevators, *right, above*, can handle short horizontal runs after the vertical lift.

Two popular units in today's plants are the flight and belt conveyor, *right*. Drawings illustrate basic flight and belt construction and the trippers and shuttle conveyors used with belts for horizontal distribution.

It is common practice to equip belt conveyors with magnetic pulleys to separate tramp iron from coal before delivery. In addition to the electromagnetic designs, permanent magnets have come into use. Magnetic separators are sometimes used at other points in the handling system.

. . . others serve best on horizontal runs, and . . .

Flight conveyors, like elevators, use endless chains but have spaced scrapers or flights to push or drag coal along a trough. In simplest form, they can be several hundred feet long, travel up inclines of as much as 25 deg without backward cascading of coal. Above about 40 to 45 deg, capacity loss becomes too great. A typical 2-chain conveyor of this type handles 250 tph at 100 fpm. Discharge may be at end or at intermediate points through gates in the trough. On horizontal runs, flight conveyors require little headroom.

Continuous-flow or Redler design employs a duct within which closely spaced skeleton flights act as the conveying element. The conveyor feeds itself at any point with a uniform load that fills the duct and entirely surrounds the conveying element. When the flights move they cause the material to flow upward or forward with them in a solid column. Coal can be discharged at any opening where it can fall away from the flights.

The Redler type requires no deep loading pit, only enough room for gravity feed. Skeleton flights are detachable from the central chain. Connecting joints are flexible, to permit moving around corners. There is normally no metal-to-metal contact in the carrying run since coal completely surrounds the flights. Casings are dust-tight and connections can be made dust-tight also. This design serves equally well for horizontal, vertical or inclined runs.

Belt Conveyors. Relative simplicity, few moving parts, minimum friction and hence low power needs, make belt conveyors a popular choice. In comparing belts with other conveyors, however, supporting bridge, sheathing, walkways etc, must be reckoned in the cost.

With belts, as with bucket elevators, only relative motion between coal and conveyor occurs at loading and discharge. But this holds true for belts only up to an incline of roughly 15 to 20 deg. By varying belt width and speed a wide range of capacity needs can be met. Belt conveyors in horizontal runs need little headroom except for trippers.

Simple construction of the belt conveyor involves carrier or troughing idlers and return idlers. Carrying idlers are almost always of the 3-pulley type. Spacing and diameter of idlers is important: too much space leads to belt sag and shock as it meets each roll. If idlers are too small, belt bend is sharp. Either reduces belt life.

Most belt wear, though, develops at the loading point. So every effort goes into reducing shock there. Oncoming coal is accelerated in direction of belt movement to lower relative motion between coal and belt. Coal should never land directly over a solid pulley; hammer-anvil action wears belt. Hence loading chute should deliver between idlers preferably, but far enough ahead of tail pulley to put in at least one belt-steadying carrier pulley.

Weather, cuts, gouges prove worst enemies of belts. Fabric exposed to weather absorbs moisture if protective cover is gone. In warm weather mildew and rot may set in; in cold weather ice crystals may gnaw from within as belt flexes.

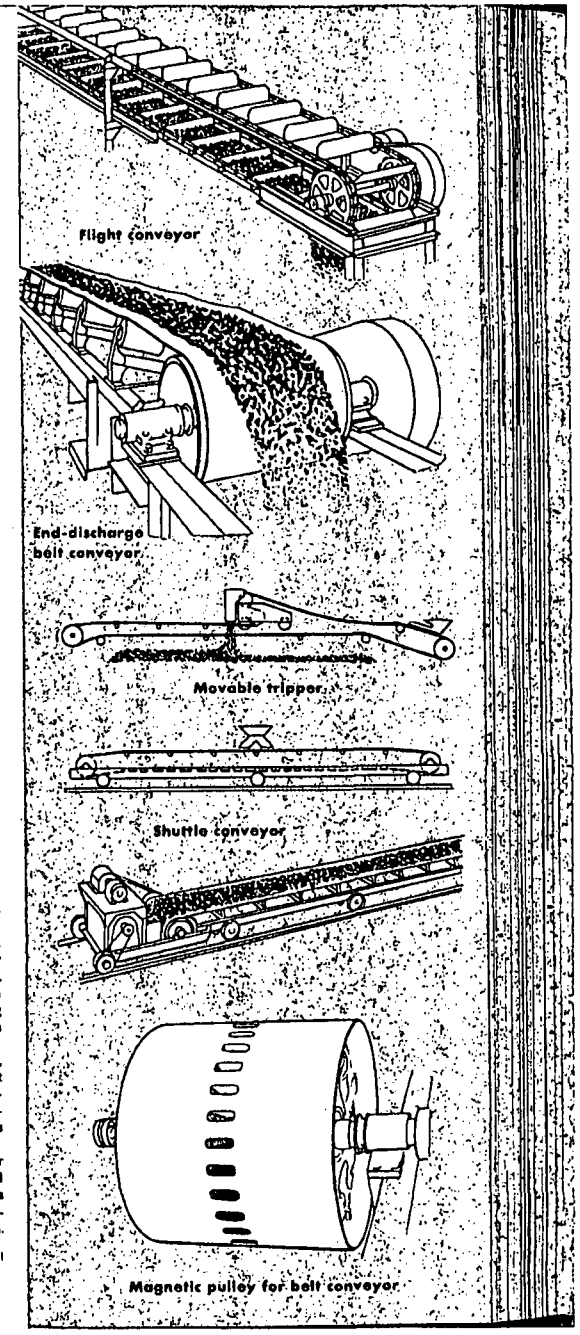
. . . many do both jobs

Simplest discharge setup is from the end. When distribution along belt length is needed, as over a long bunker, trippers are used. These may be fixed or movable. In the movable type, snub pulleys that bend back the belt for discharge at the tripper are mounted on a hand- or motor-propelled frame riding on a runway. When it is necessary to pile coal either side of a conveyor, a high tripper discharging to a transverse reversible belt can be used. Such heavy trippers are almost always motor-propelled.

Another distribution scheme uses the shuttle conveyor. It consists of a reversible belt mounted on a frame for longitudinal travel; the frame is hand- or motor-propelled. Coal can be discharged from either end. A shuttle with about 75-ft centers will cover up to 160 ft from a loading conveyor midway in its length. Short shuttles suffer from frequent impacts per unit of belt length.

Screw Conveyors. In smaller plants, screw conveyors, mentioned before as feeders, often serve. Inclined units lift coal to storage bins and frequently directly to stoker hoppers. Horizontal screw conveyors are often used as bin-to-stoker feeders. Simplicity, dust-tightness and compactness make the screw type attractive.

Monorail systems are also used in smaller plants for horizontal movement — often from bunker to individual firing units. Hand-operated systems have tip-over buckets on chain hoists. Carriers may be motor-propelled, with electric hoists and side-dump buckets. Scales may be built-in.



Flight conveyor

End-discharge belt conveyor

Movable tripper

Shuttle conveyor

Magnetic pulley for belt conveyor