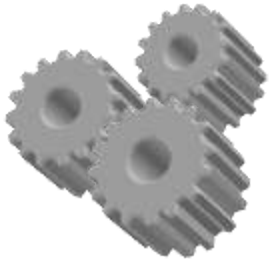
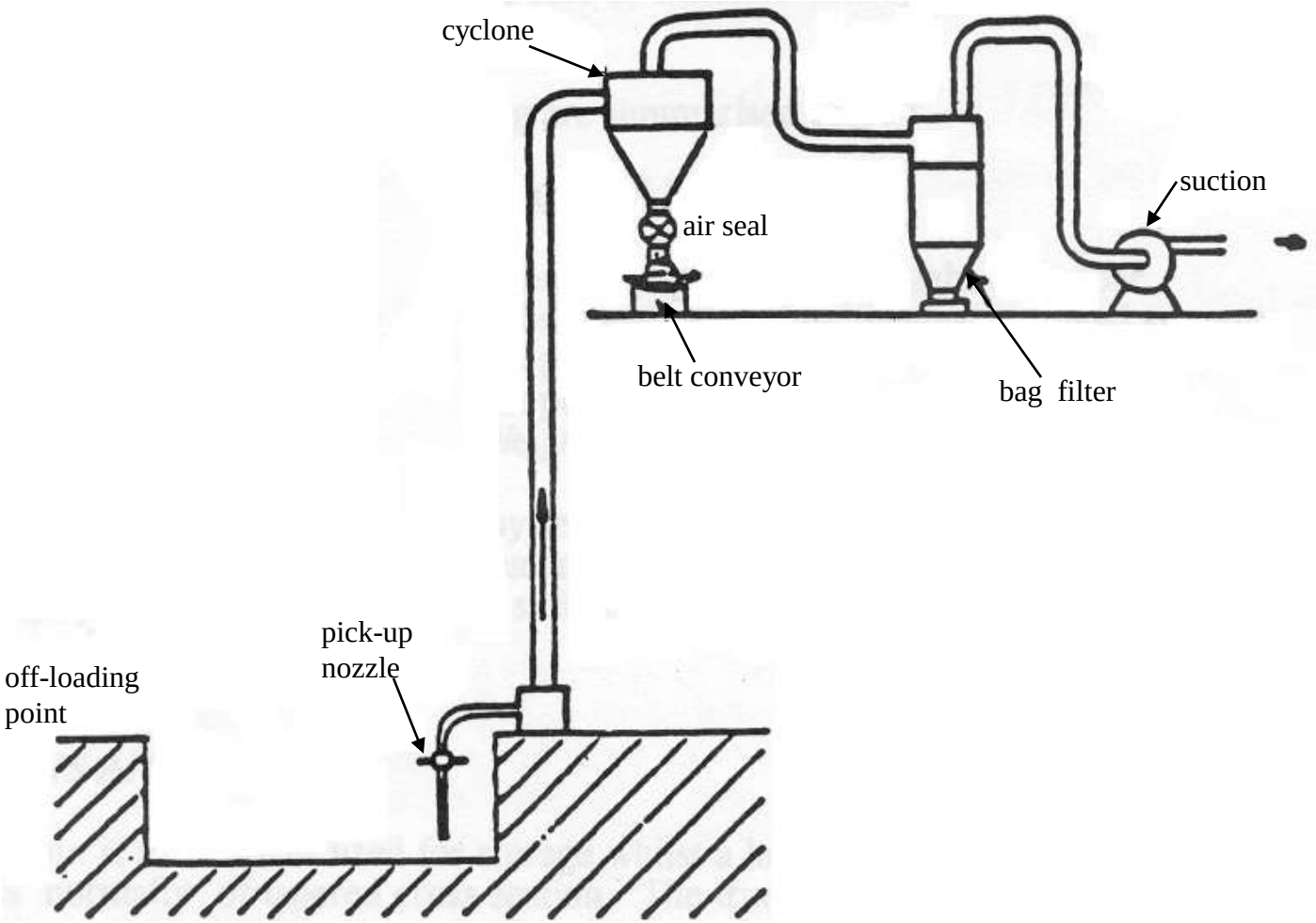
MATERIALS HANDLING

CONVEYORS

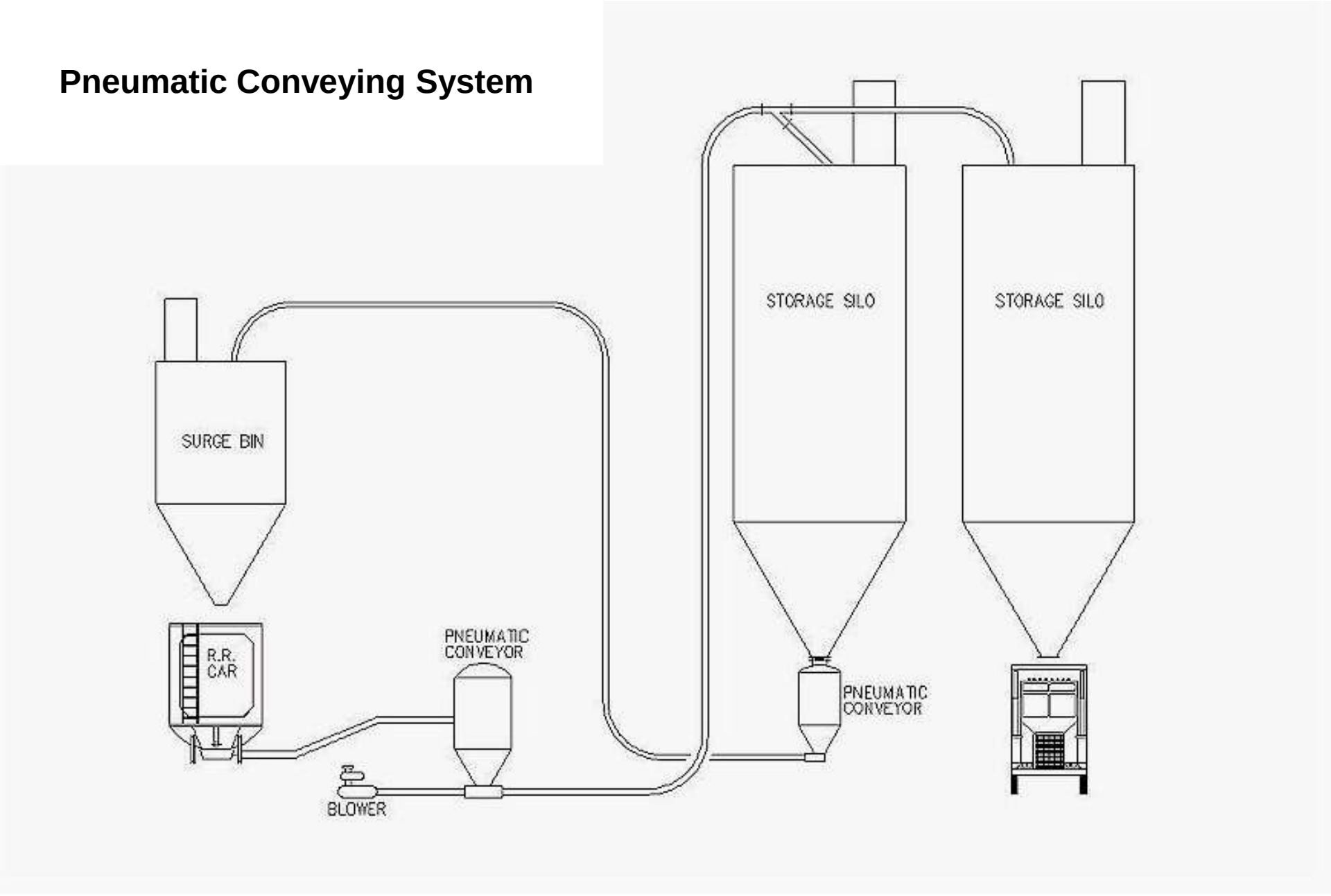
ELEVATORS



Pneumatic conveying



Pneumatic Conveying System



With enough air you can move anything. Although this comment is true, we should qualify it by saying there is a cost related to air consumption. Some materials are just not good candidates for pneumatic conveying. If the material meets some of the following criteria, then you should consider pneumatic conveying as a preferred method:

- Very fine, dry & free flowing.
- Dust containment is required.
- Potentially hazardous.
- More suitably controlled for an injection or metering process.
- Blending

Pneumatic Conveying offers many advantages. Generally, the installed cost is less expensive than with other conveying methods, and the equipment often requires less maintenance per ton of material conveyed. Also, it becomes very attractive wherever the conveyor system is routed through limited space in a plant, and/or if housekeeping is an important issue.

Overview of Pneumatic Conveying

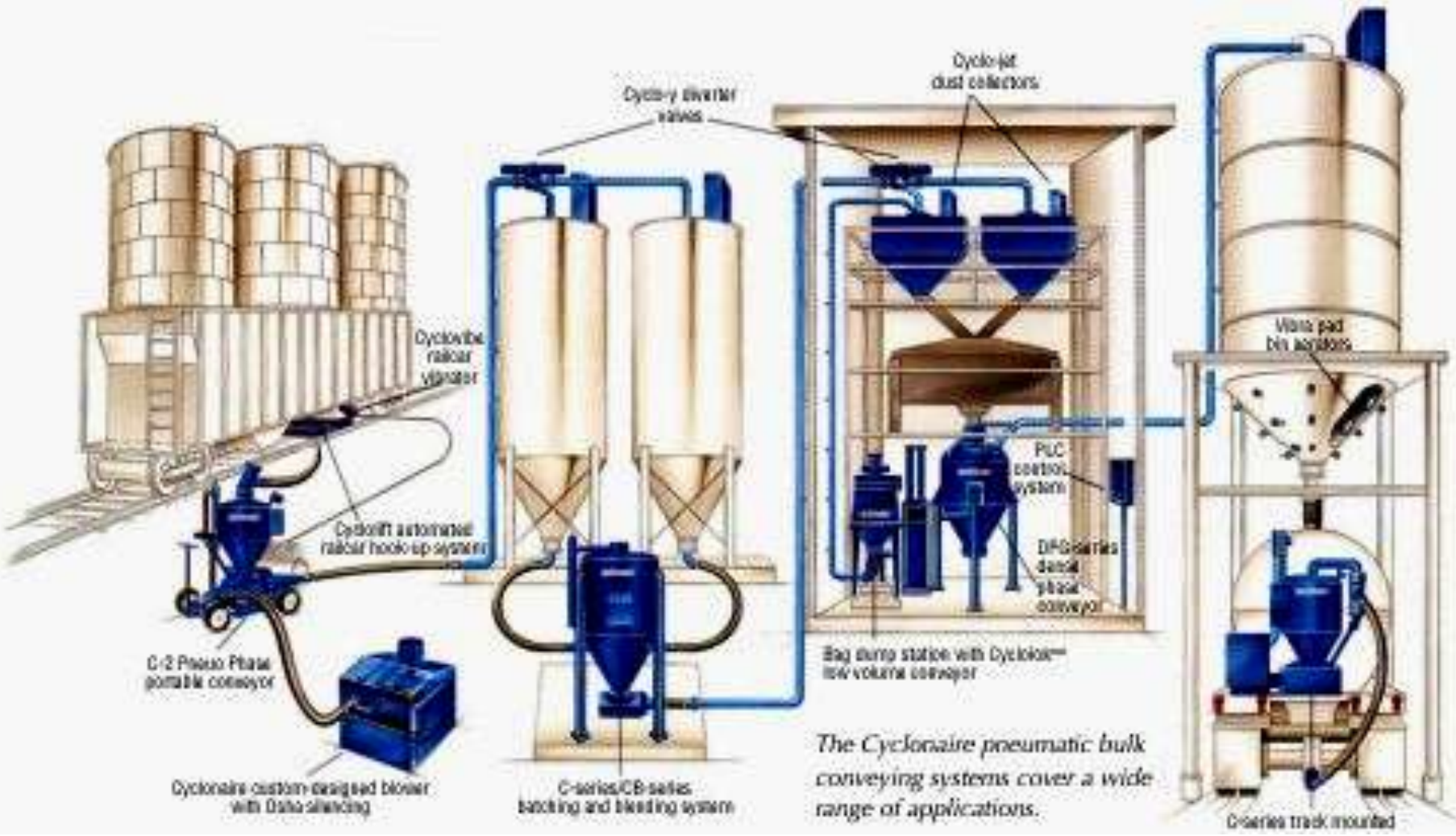
Typical Conveying Regimes:

1.Solid Dense Phase - Very low material velocity, pipeline full of material - an excellent regime for fragile materials.

2.Discontinuous Dense Phase - Low material velocity - with high line loading ... material moves in plug flow fashion - best regime for most applications in which power economy, pipe erosion, and material degradation issues are important.

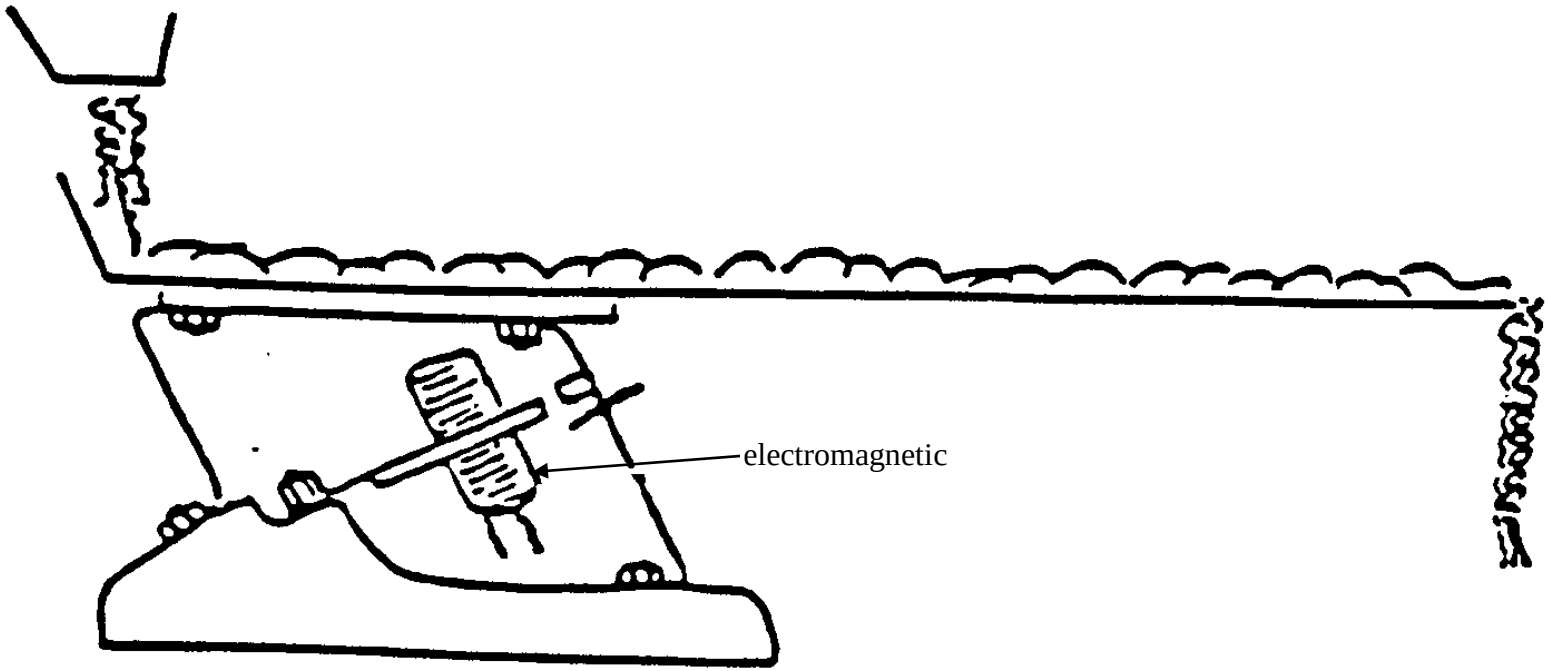
3.Continuous Dense Phase (Moving Bed) - Higher velocity than discontinuous dense phase, but much lower than dilute phase. Used for handling powders that can be fluidized.

4.Dilute Phase - Material velocity above the saltation velocity - no upper limit to the velocity - least attractive regime for operating economy - unsuitable for fragile or abrasive materials or materials with wide particle size distribution.

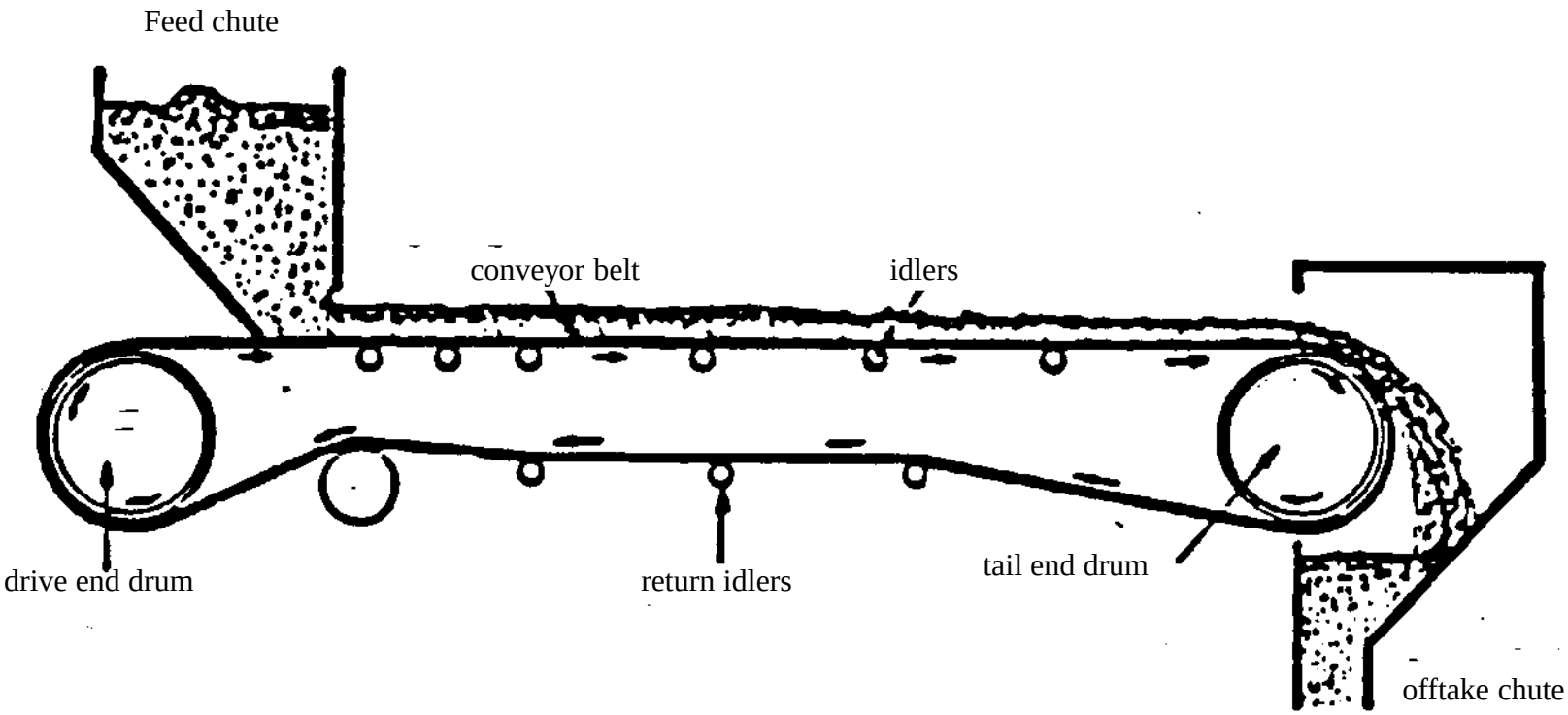


The Cyclonaire pneumatic bulk conveying systems cover a wide range of applications.

Vibratory conveyors



Belt conveyors



Belt conveyor systems

Dust tight belt conveyors

Mineral conveying at
1000 tonnes per hour

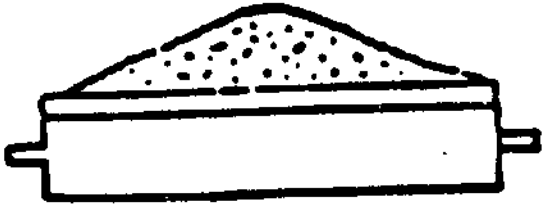
The wide range of products available has capacities from 100 to 5,000 tonnes per hour.

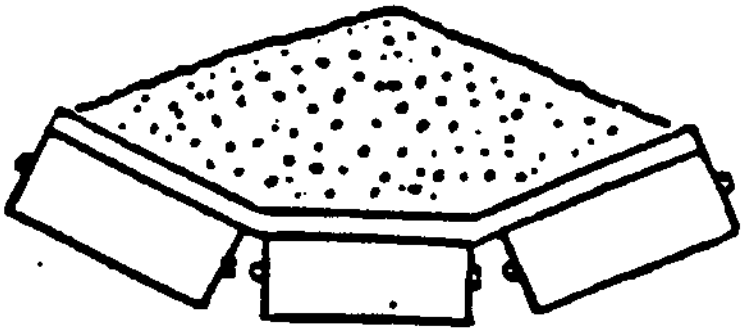
The various belt conveyor systems available can complement and support the en- masse conveyor, extending the handling system into a comprehensive contract package for most industries.

Fully enclosed belt system

Troughed belt and idler

Section of: flat belt and idler





Ground conveyor over long distances

Totally enclosed conveyor

Elevated spans over ground obstructions

Overhead stacking-out conveyor

Tunnel reclaim conveyor

Shiploader conveyor

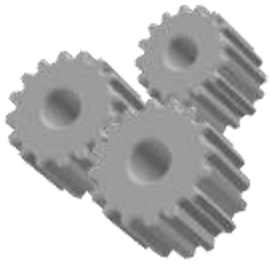
Shuttle conveyor

Fixed or travelling trippers

Convex or concave curves in elevation

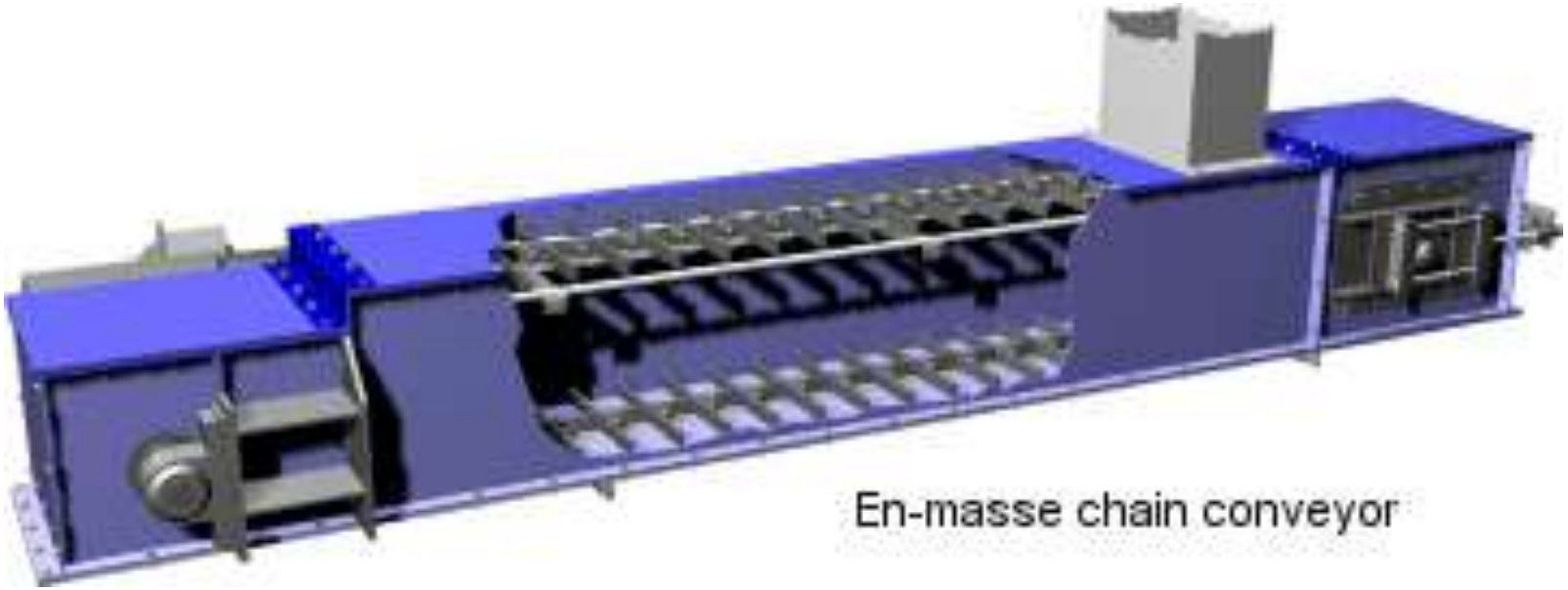
Boomstackers to form linear, radial or hippodrome stockpile

High speed centrifugal throwers



Chain conveyors

Capacities range from 10 to a formidable 2000 tonnes per hour.



En-masse chain conveyor

Product range is extensive and diverse; from heavy duty gas tight and high temperature water cooled machines, up to 900ºC, serving the Chemical, Cement, Mineral Processing and Steel industries, to stainless steel clean line machines for the Food industry.

Conveying 50 tonnes per hour
of soda ash at 150°C

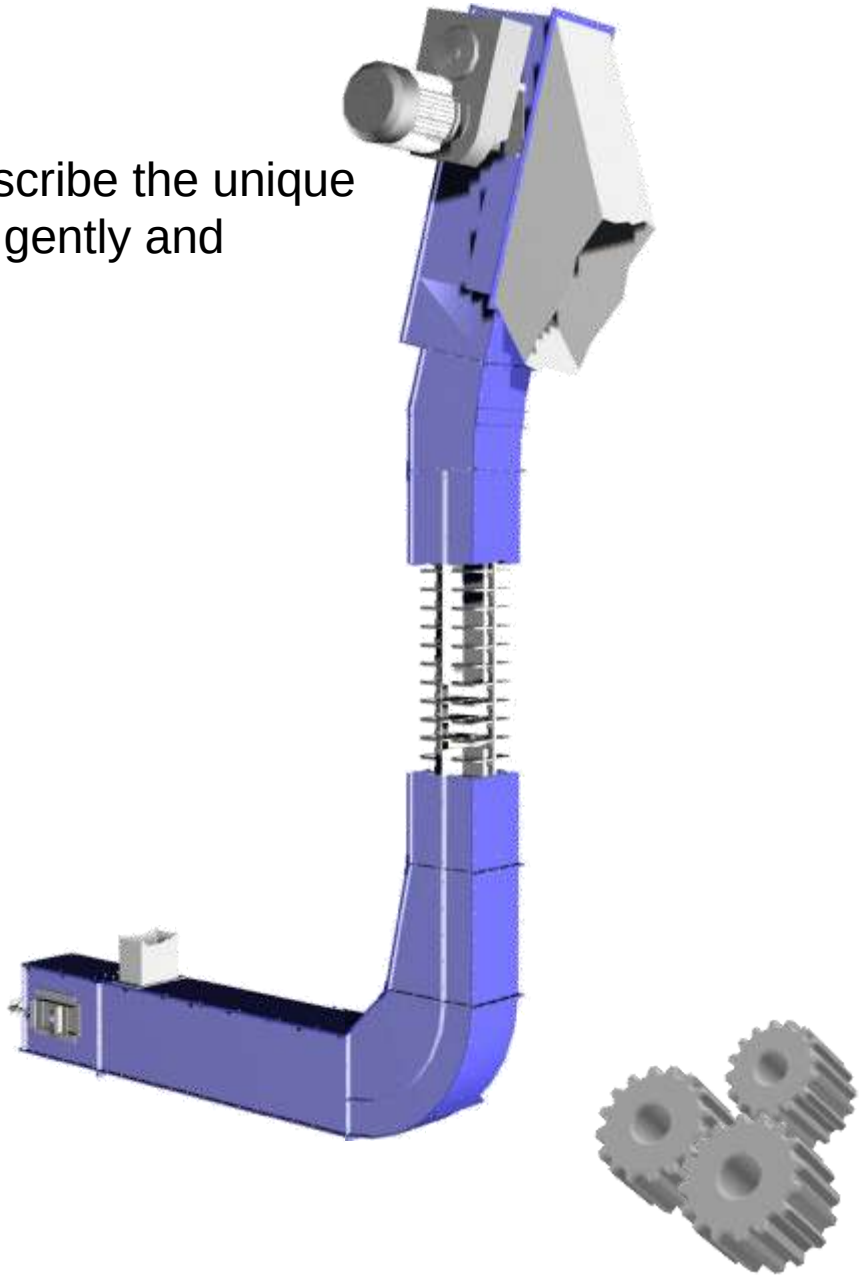
Typical over-silo conveyor

Conveyor handling grain
at 2000 tonnes per hour

En Masse Elevating

En masse movement is the term used to describe the unique method of conveying bulk materials cleanly, gently and economically

Movement of the chain when buried in the material will induce the whole mass to move forward gently in a solid column. Elevator design permits the column of material to be moved vertically or on an inclined plane.



Elevator Construction

1. **Drive and Tension Terminals**
Fitted with precision machined hardened steel sprockets and wheels running in self aligning ball or roller bearings. Shaft sealing is affected by special glands.

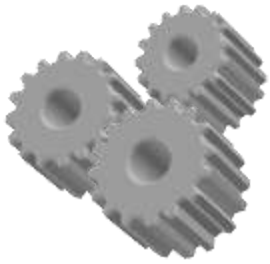
2. **Drive Arrangements**
A typical drive arrangement is an integrally mounted geared motor driving the sprocket shaft through a totally enclosed chain drive incorporating a shear pin overload safety device. Larger drive assemblies incorporate a motor coupled to a gear unit through a flexible or fluid coupling all mounted on an independent base.

3. **Conveyor / Elevator Casing**
Fabricated from hot rolled strip mill steel. Chain runners manufactured from special steels are provided where required. All cross sectional figures are ground after assembly to ensure perfect alignment. Inlets, outlets, inspection ports are pre-cut to ensure accuracy and quality finish.

En-masse elevator handling fly ash

Chain

REDLER chains are produced from high tensile alloy steel drop forgings, fitted with precision welded flights. The links are case hardened to give increased wear protection.



Safety Features

Overload Device - Electronic or mechanical shear pin.

Choke Detector - where appropriate these are fitted at the final outlet of the machine.

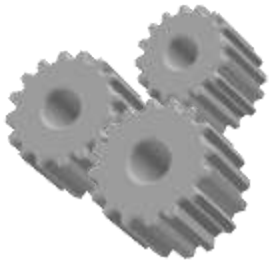
Special Features

Predominantly when handling wet, abrasive or corrosive products, machines can be or are fitted with:-

Stain resistant chain pins
Internal replaceable liners

i.e. EN18 - Red Diamond - Nihard - Manganese

Special casing i.e. galvanised - Cromweld - Stainless Steel



REDLER Quality Drop Forged Chain

Material Specification

CHAIN

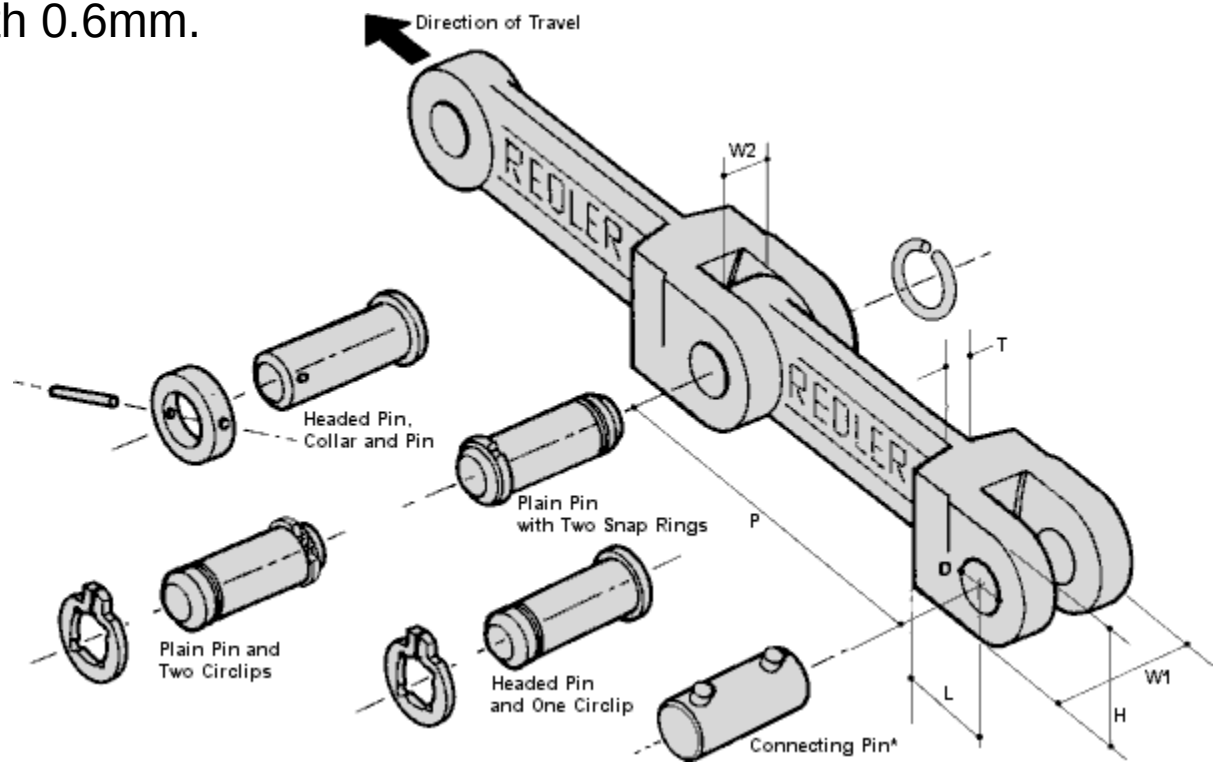
X-Alloy Steel – Case hardened, surface hardness RC 57 min.

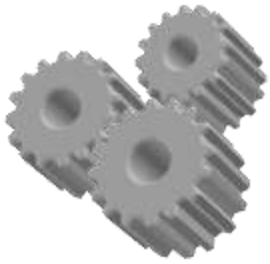
C – Carbon Steel – Case hardened, surface hardness RC 57 min.

D – Alloy Steel – Through hardened (for higher U.T.S.).

PINS

Alloy Steel – Case hardened, surface hardness RC 57 min. effective case depth 0.6mm.



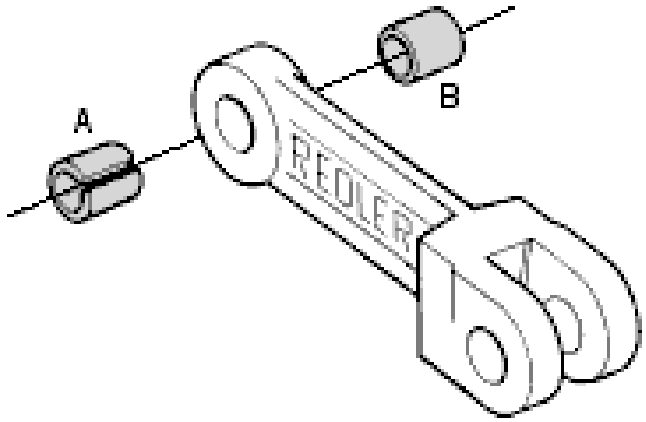


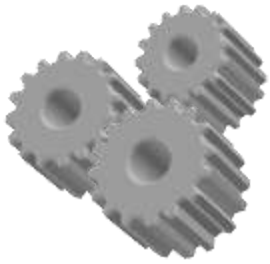
Anti Wear Bushes

•Fitted to male end of chain.

•For abrasive, arduous and chemical applications.
•
Type ‘A’: Split, wear resistant bush.
Type ‘B’: Solid, corrosion resistant bush.

Note: Fitting of either type of bush reduces the breaking load of the chain.





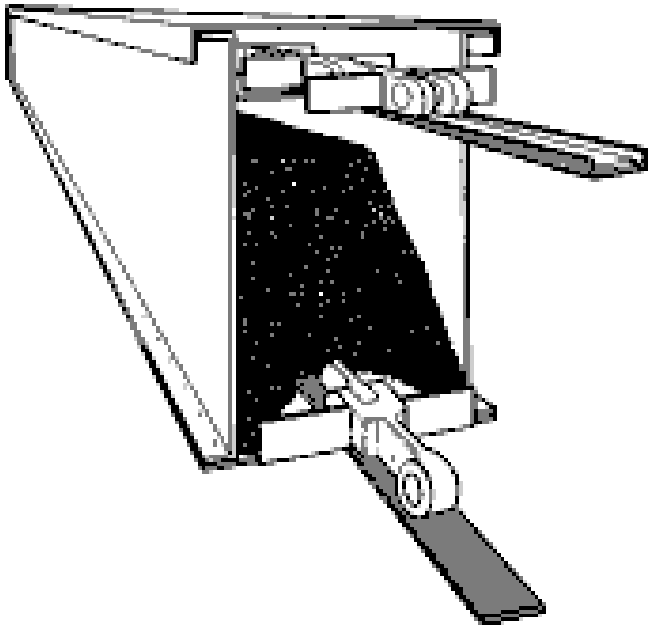
Chain Runners

•Within REDLER machines the chain is normally carried on special wear resistant manganese steel strip runners, with the strip being available in varying widths and thickness.

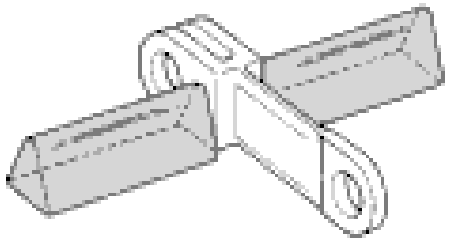
•Where the chain is conveying product, the runner is normally mounted directly onto the casing bottom plate.

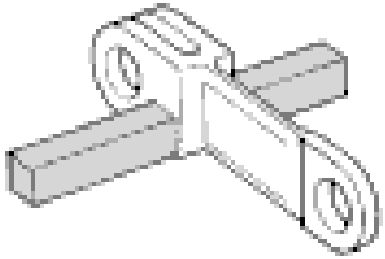
•For the return – non conveying run – of chain, the runner is normally mounted within a rolled mild steel 'U' section supported on cross bars.

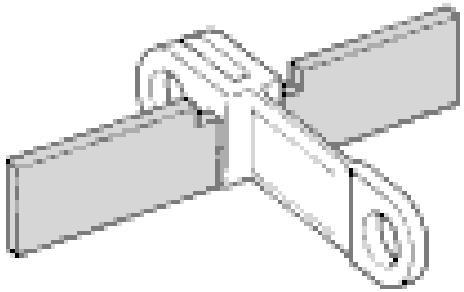
•The full range of manganese runners and supports is available for fitting to any size or make of 'en-masse' conveyor or elevator.

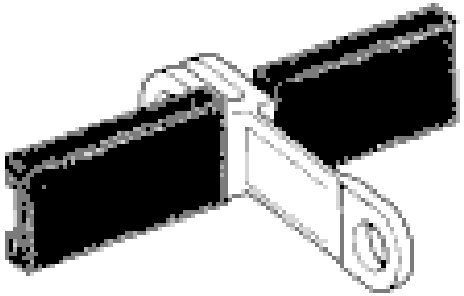


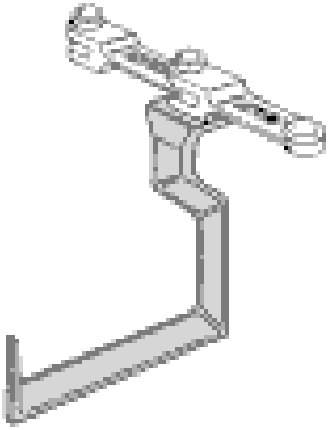
Conveyor Chain

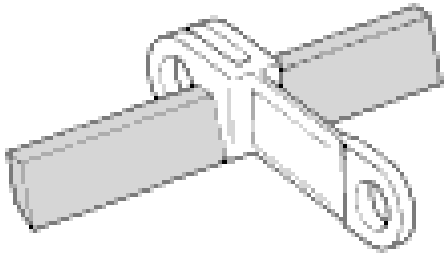


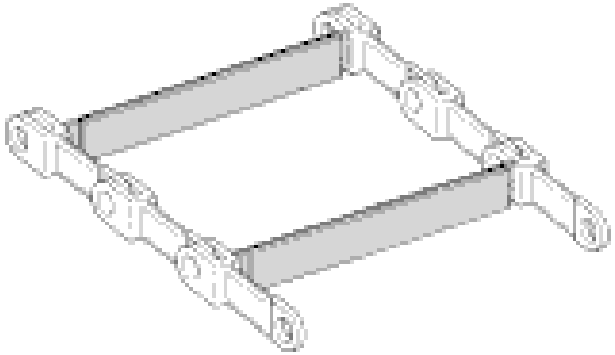


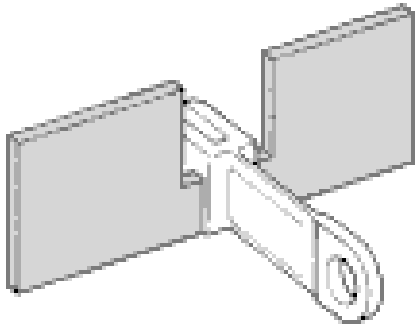


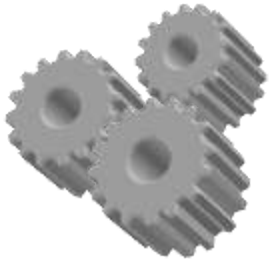




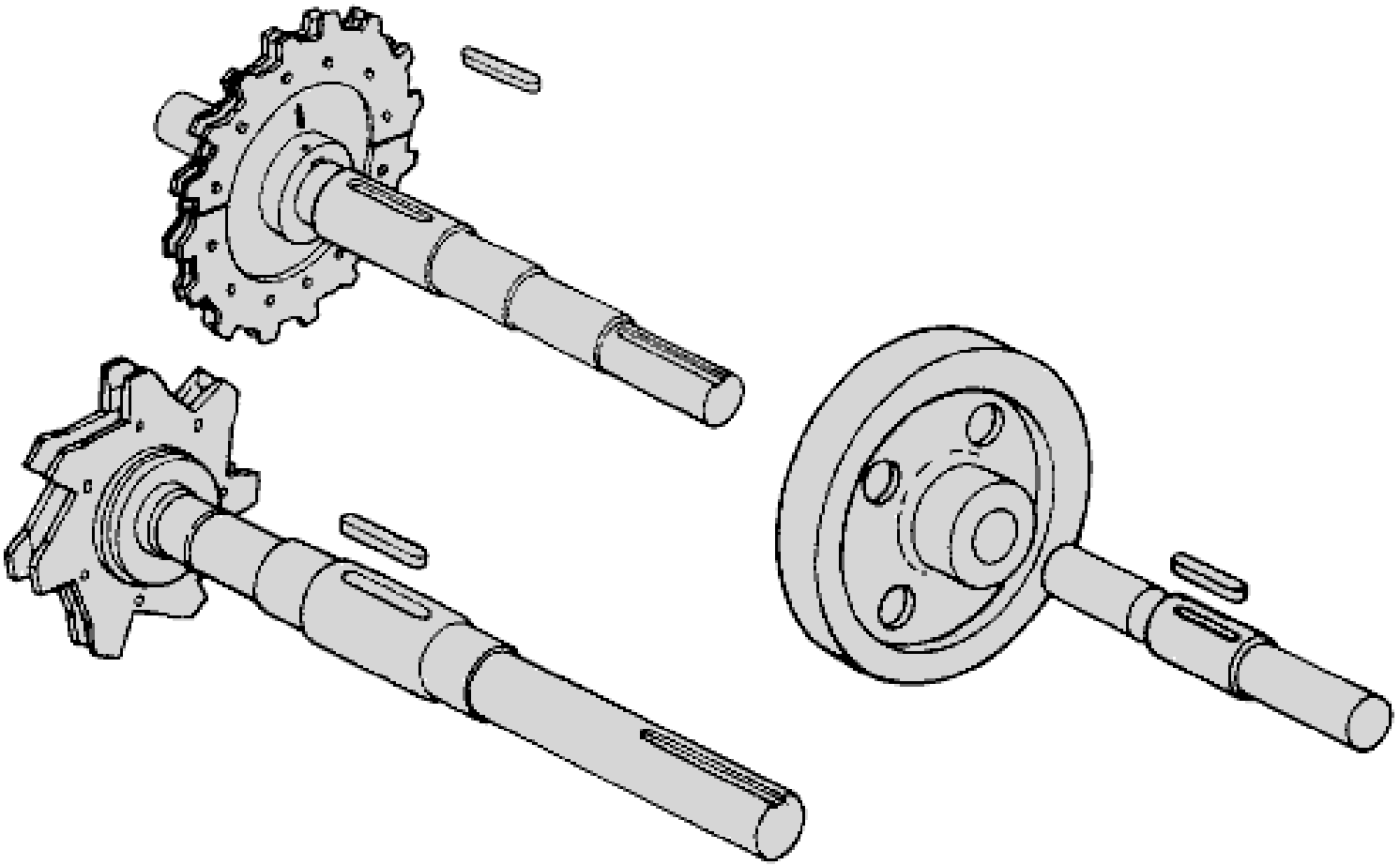


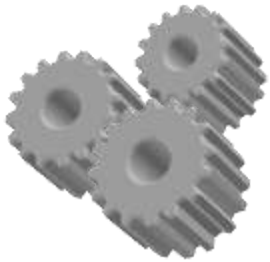






Sprockets and Trailers

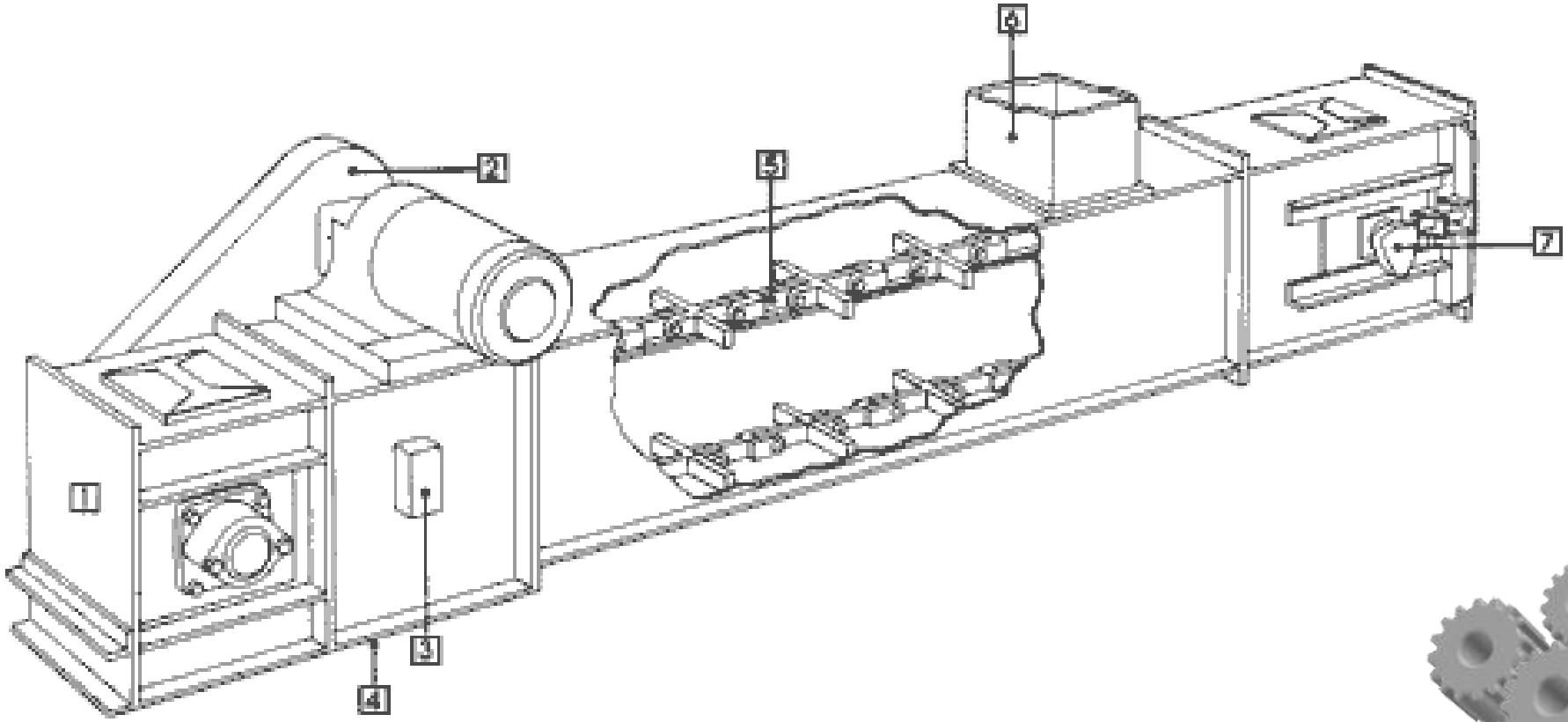




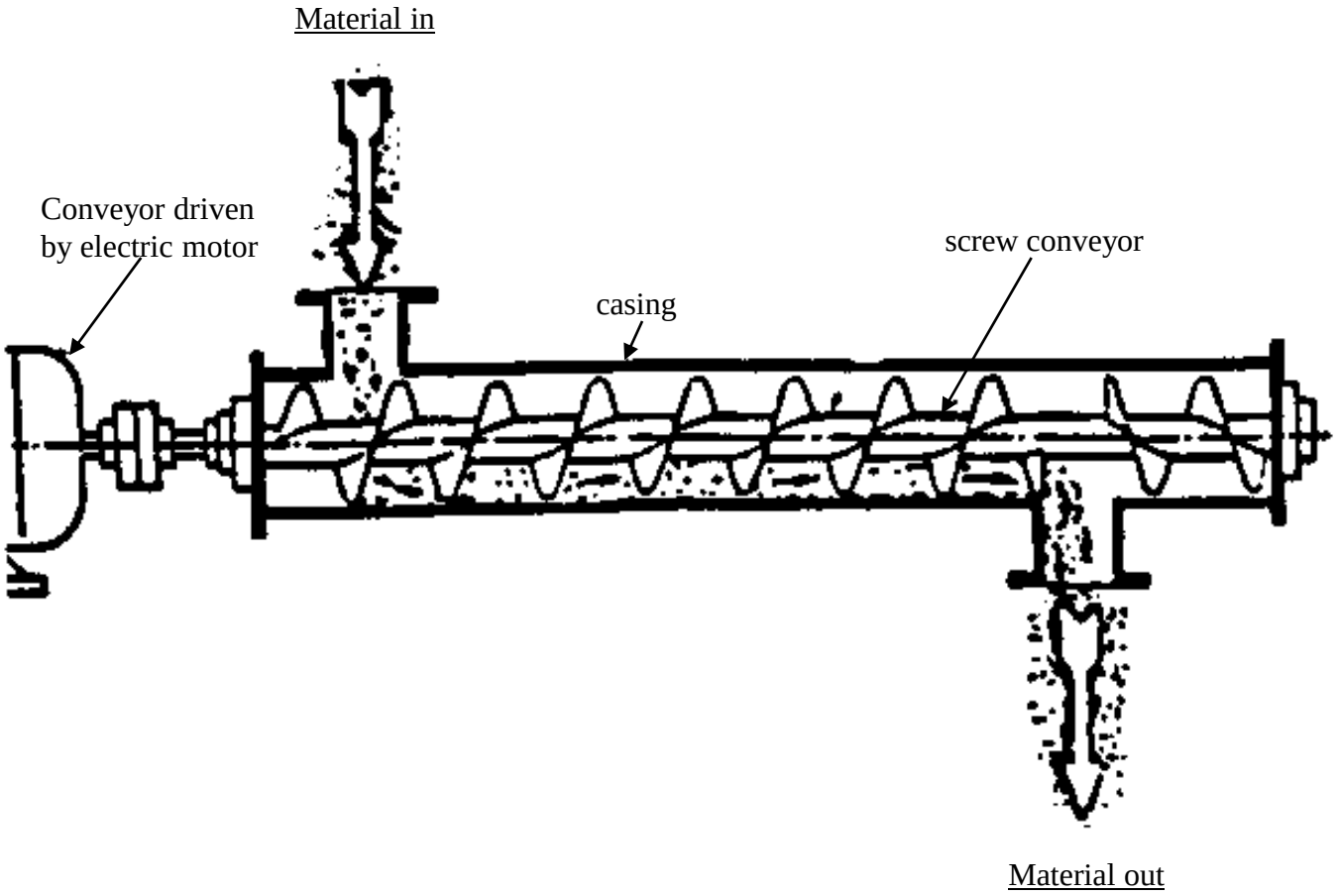
Movement of the chain when buried in the material will induce the whole mass to move forward GENTLY in a SOLID, PLACID COLUMN ‘EN MASSE’.

Material dragging, particle tumbling or rolling DOES NOT occur.

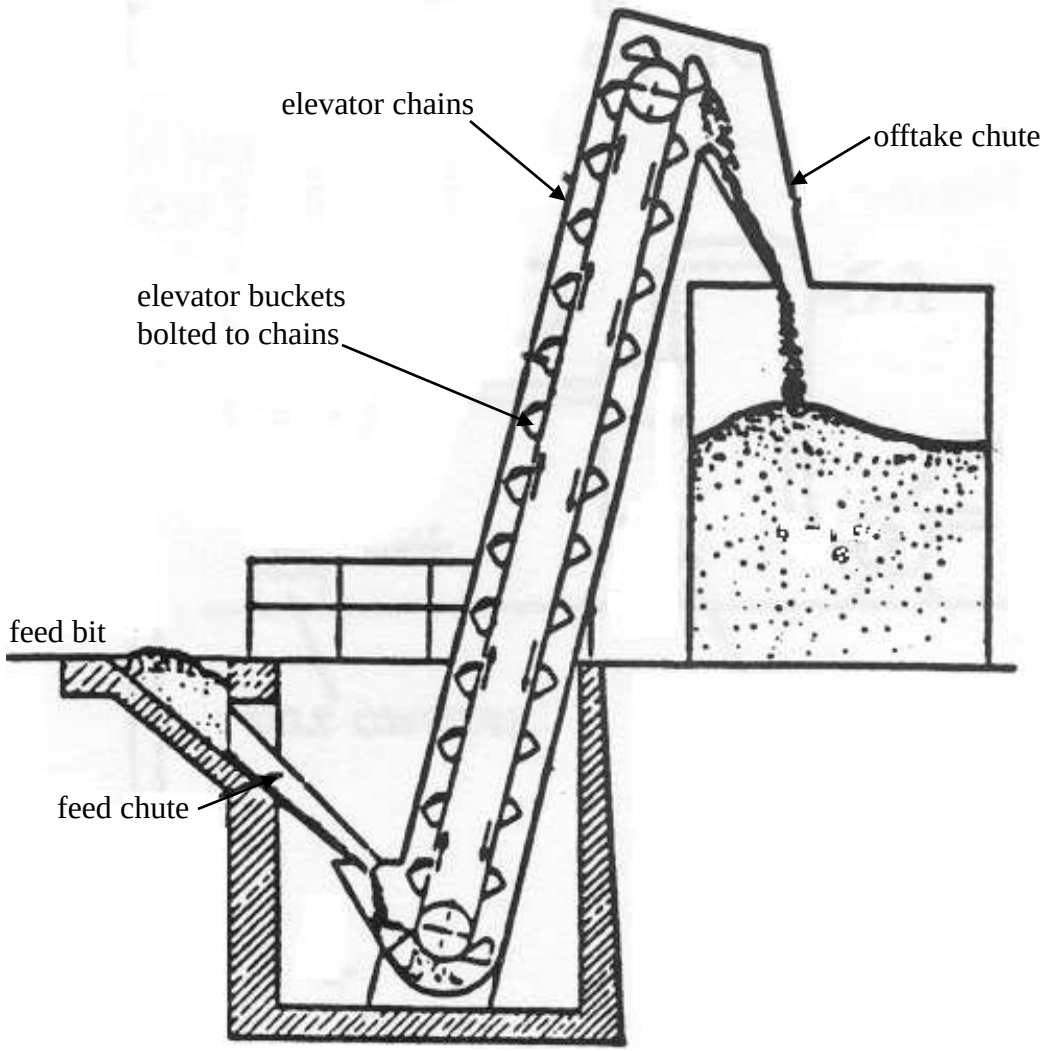
- Multiple inlets and/or outlets will provide proportional conveyor intake or conveyor output.
- REDLER ‘two-way’ conveyors will convey in both directions.



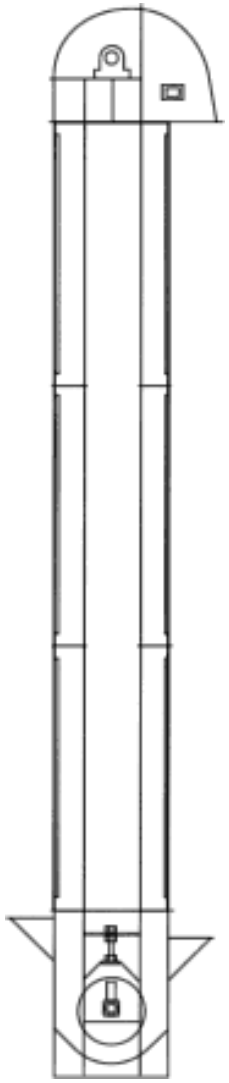
Screw conveyors

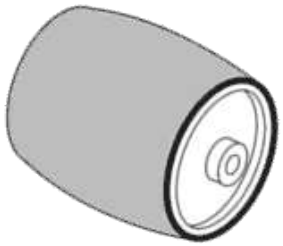


Bucket elevators

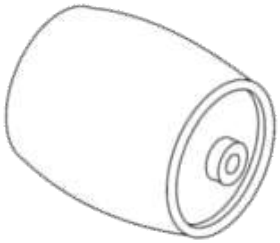


Belt and Bucket Elevators

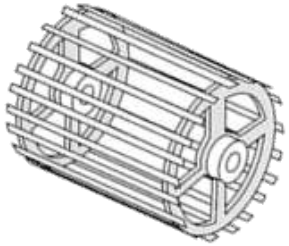




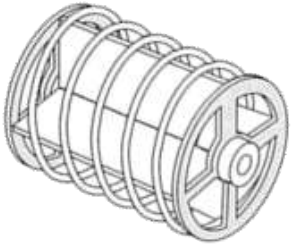
Lagged Pulley



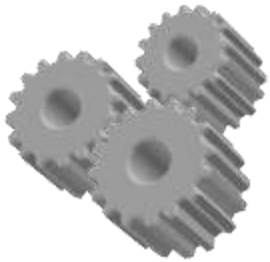
Solid Crowned Pulley



Slatted Pulley



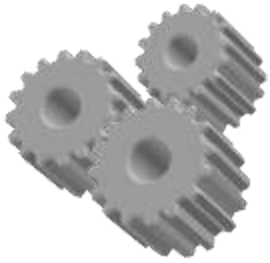
Caged Pulley



Head Section: Manufactured from 3/5mm quality steel, stiffened and flanged for accurate assembly. The head section comes complete with a removable top profiled section for quick access to the 6mm thick rubber lagged pulley and shaft/bearing arrangement. The standard rubber lagged pulley assists the elevator for 'start up' under loaded conditions and contributes to good belt alignment.

•**Boot Section:** Manufactured from 3/5mm quality steel flanged and stiffened for rigid construction and alignment. The elevator boot comes complete with a fabricated crowned pulley and shaft assembly with ample access and inspection doors incorporated with the boot design which also features a self cleaning boot arrangement as a standard feature which minimises product degredation and admix. The elevator belt is tensioned via a screw arrangement on either side of the boot with capacity being achieved no matter which level the boot pulley is positioned.

Casing: Constructed from 2/3mm quality steel in 2.4 metre sections, flanged for true alignment and easy installation in a neatly designed single or split leg arrangement

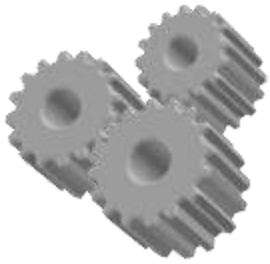


•**Belt:** 3/4 Ply E.P.Elevator Belting consisting of polyester/polyamide woven low stretch carcase, with 1mm/1mm styrene butadiene rubber covers as standard with nitrile (oil resistant) covers being optional. Food quality or heat resistant belts are also available.

Buckets: Quality pressed steel buckets designed to give maximum throughput but still maintaining the perfect fill and discharge characteristics. Optional plastic or stainless steel buckets are available on application.

•**Drive:** Shaft mounted direct drive fitted with a brake motor or a vee belt drive arrangement utilising a shaft mounted gearbox complete with backstop. Type of drive depends on elevator size although both utilise IP55 weatherproof motor units.

Explosion Relief: All Redler Elevators come complete with a hinged explosion relief door fitted with a limit switch adjacent to the head section of the Elevator, plus a pair of explosion relief panels every six metres or casing



Chain and Bucket Elevators

GENERAL DESCRIPTION

Chain and bucket elevators are of robust construction to suit arduous duties required in heavy industries. Abrasive and hot materials can be handled successfully with the chain and bucket elevator.
Fabrication can be in mild steel, stainless steel or special materials to suit product to be elevated.

CHAIN
Either round link, roller or malleable chains are used. The chain is heat treated and hardened to resist wear when used with abrasive products.

SPROCKETS
These can be supplied in cast iron, cast steel, toothed or friction drive, segmented and with wear resistant surfaces.

BUCKETS
These are designed and fabricated to suit the particular material to be handled and provide good pick up and discharge features. For abrasive materials, the bucket edge is reinforced with hard wear-resistant welds.

HEAD SECTION
This is a robust, fully welded construction, with removable head sections for easy access to drive shaft sprockets. Ball or roller bearings can be fitted, together with an anti-runback device. Inspection doors are provided at strategic positions.

INTERMEDIATE CASING SECTIONS

These are fabricated in standard 3.0 metre lengths, with make up section lengths to suit overall height of elevator. Single or double casing sections is available, of pressed, welded and bolted construction. Casing section covers can be removed for inspection or maintenance. Inspection doors are provided at strategic positions and when necessary explosion panels can be included.

BOOT SECTION

This is of fully welded construction, suitably stiffened. The side panels carry the screw type tensioning device on the boot shaft assembly, together with ball or roller bearings. The boot section incorporates the inlet chute and removable clean out doors. Gravity take up is used on certain applications.

SAFETY DEVICE

REDLER bucket elevators are fitted with a RoCon© rotational control unit. The RoCon© unit will react to change in the pulley speed and provide a signal to the power supply to the drive motor. A boot level sensor can be fitted to prevent start up with a flooded elevator boot.

Applications

•All industries in particular mining, food, chemical, paper & pulp, waste, building, wine, power generation etc.

•Controlling material from the bottom of bins, hoppers or the like

•Types of screw conveyors include horizontal, vertical, mobile, piggy back, multiple, inclined, shaftless etc.

Standard features

Low maintenance

Conveyed material is enclosed in casing

Long service life
High reliability

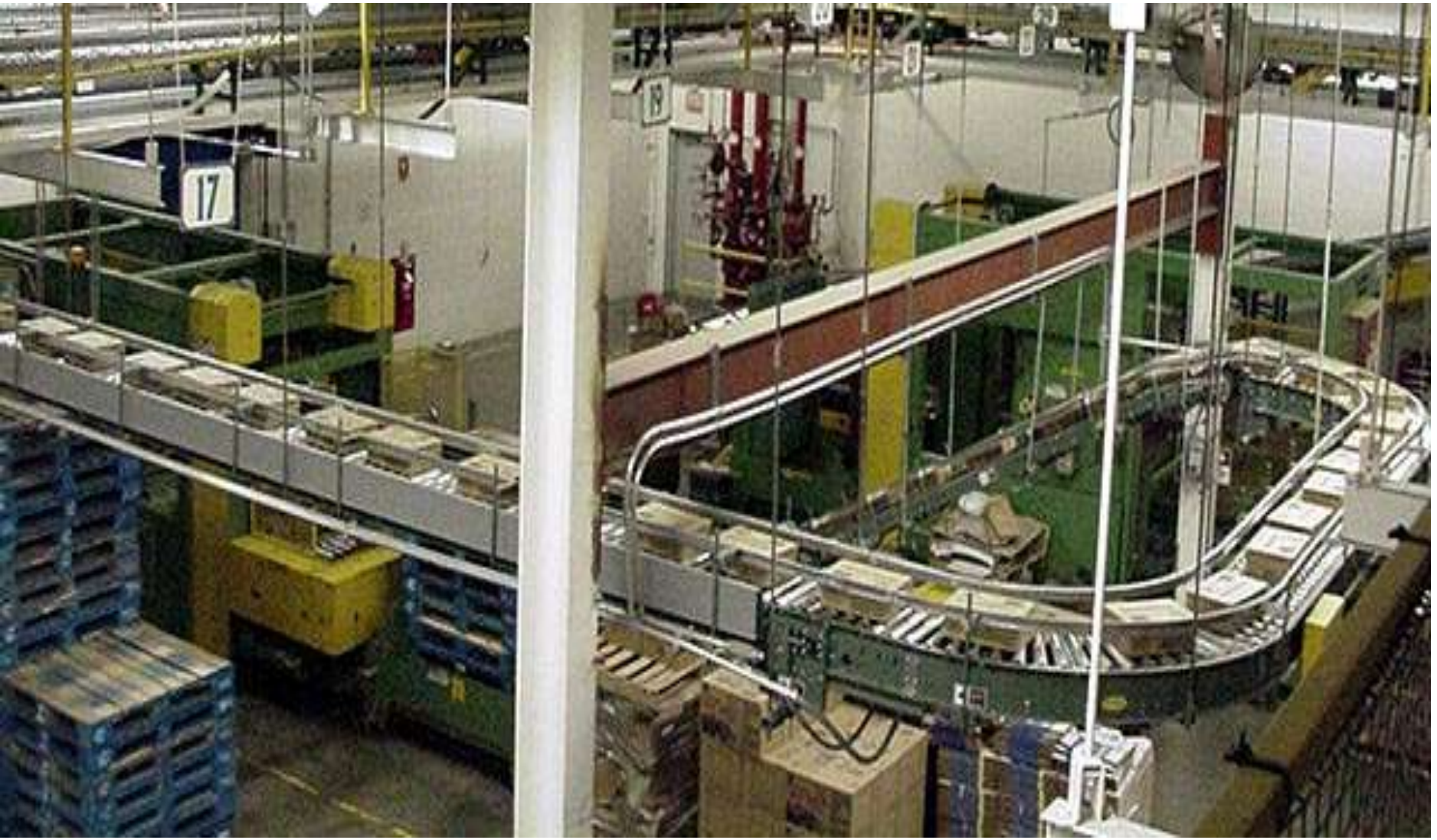
Multiple feed and discharge chutes

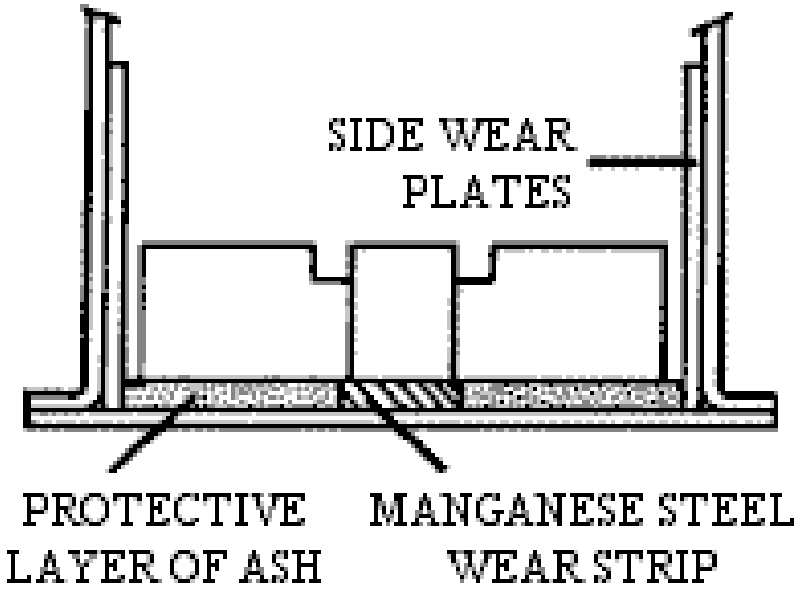
Relative low number of moving parts

Mild steel or stainless steel construction

Type of steel	Stainless steel and carbon steel
Capacity	Up to 100 m3/h
Diameter	Up to 700 mm
Drive	Standard SEW or customer's specification
Inclination	0° up to 90°
Options	Sanitary finish, movable installation, speed monitors, variable speed, micro switches, removable screw, proximity switches, double trough version
Medium	Pellets, powders, pastes
Advantages	Minimum product damage, simple cleaning, low maintenance, dust free transport

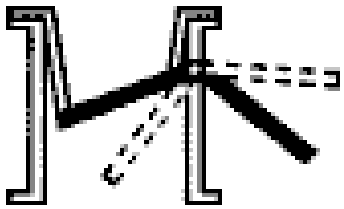
Capacity	up to 100 m3/h
Diameter	up to 700 mm
Options	Fitted with a de-watering head, trough HmpE lining or manganese steel lining
Medium	Various
Advantages	Low residual value, spanning longer distances without intermediate bearings, transport of sticky products and large lumps


17

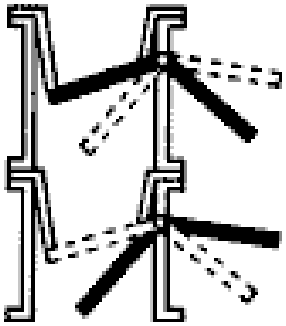

SIDE WEAR
PLATES
PROTECTIVE
LAYER OF ASH
MANGANESE STEEL
WEAR STRIP

Flow Control and System Sealing

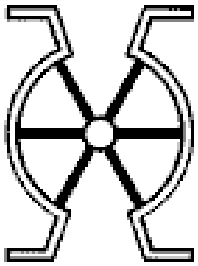
To prevent the ingress of air into a negative pressure system or the escape of gas form a positive pressure system it is advisable to incorporate sealing valves within the system, such as at positions directly below the hopper or between conveyor transfer points. This can be achieved by the inclusion of single or double flap valves which act as a seal but permit the fly ash to pass freely through the valve. Rotary seal valves can also be used and as with the flap valves their motorised operation can be fully integrated into the electrical control system. Additionally, knife valves can be used to provide a positive ‘shut off’ access or sampling points.



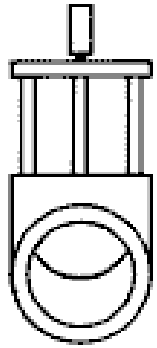
Single flap valve



Double flap valve

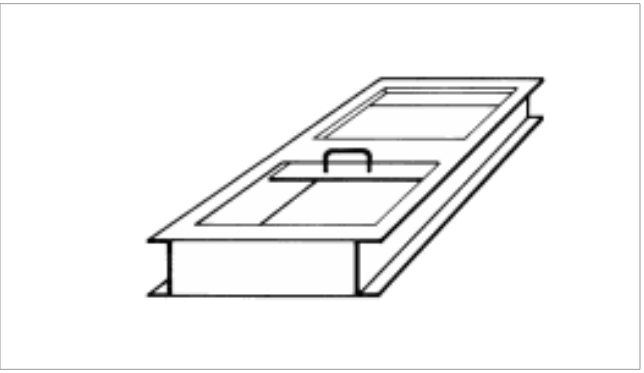


Rotary valve



Knife valve

Range

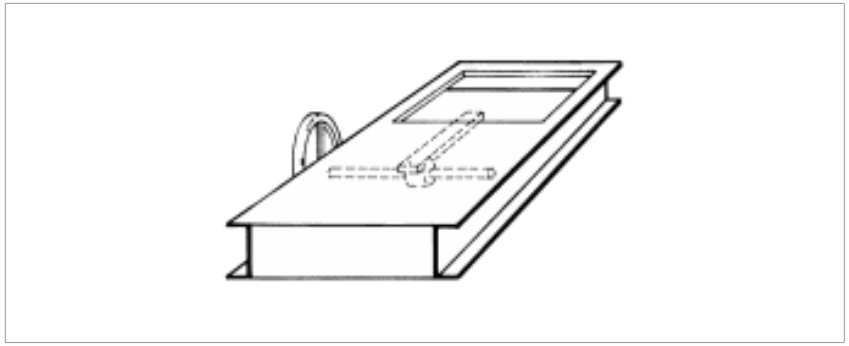


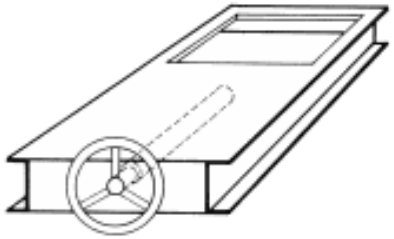
•HAND OPERATED SLIDE GATE (TYPE HOP)
The simplest type available, slide plate operation is manual via a simple handle. There is no top cover on the slide frame.

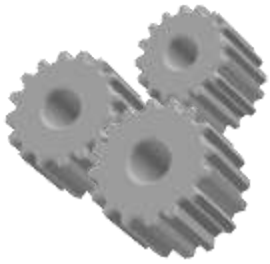
•RACK AND PINION SLIDE GATE
Of totally enclosed design, this type employs a rack pinion actuating mechanism operated by:

- •MANUAL HANDWHEEL (TYPE RPH)
- •MANUAL CHAINWHEEL (TYPE RPC)
- •AUTOMATIC MOTORISED (TYPE RPM)

Motorised units are particularly suitable for applications where an air supply is not available.





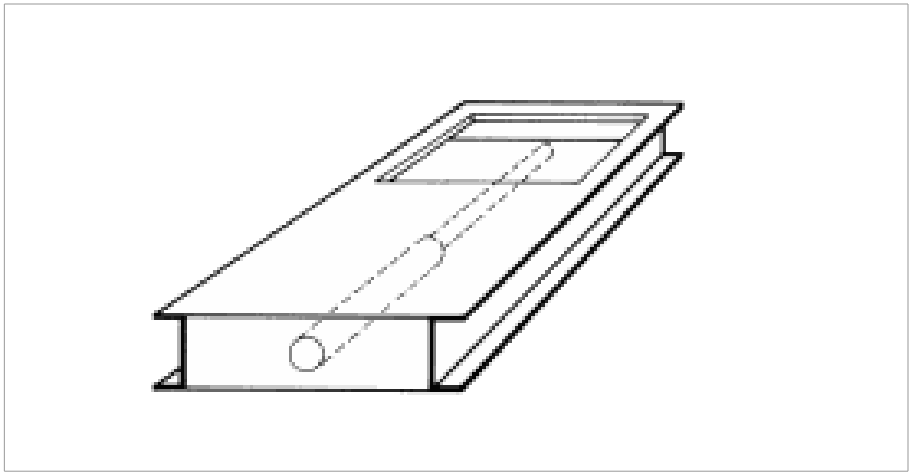


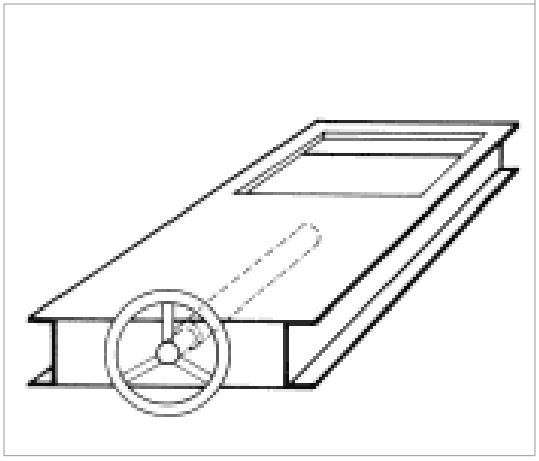
•ELECTOPNEUMATIC SLIDE GATE

The ideal choice for applications requiring automation. The air supply is controlled by a solenoid operated spring reset valve with R¼" BSP ports for G and B units and R·" BSP for L units. All valves have manual override controls and interchangeable coils are available for voltages in the ranges 24 and 50 VOLTS DC and 24-440 VOLTS AC. Adjustable throttle valves mounted on the exhaust ports of the solenoid valve control the opening and closing speeds of the slide plate.

- •SINGLE SOLENOID (TYPE EPS) or
- •DOUBLE SOLENOID (TYPE EPD) are available.

These slides may not be suitable for use beneath large silos. Please consult REDLER for recommendations.

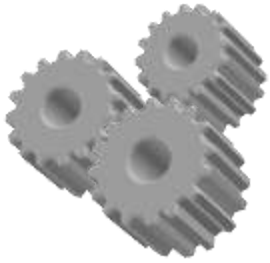


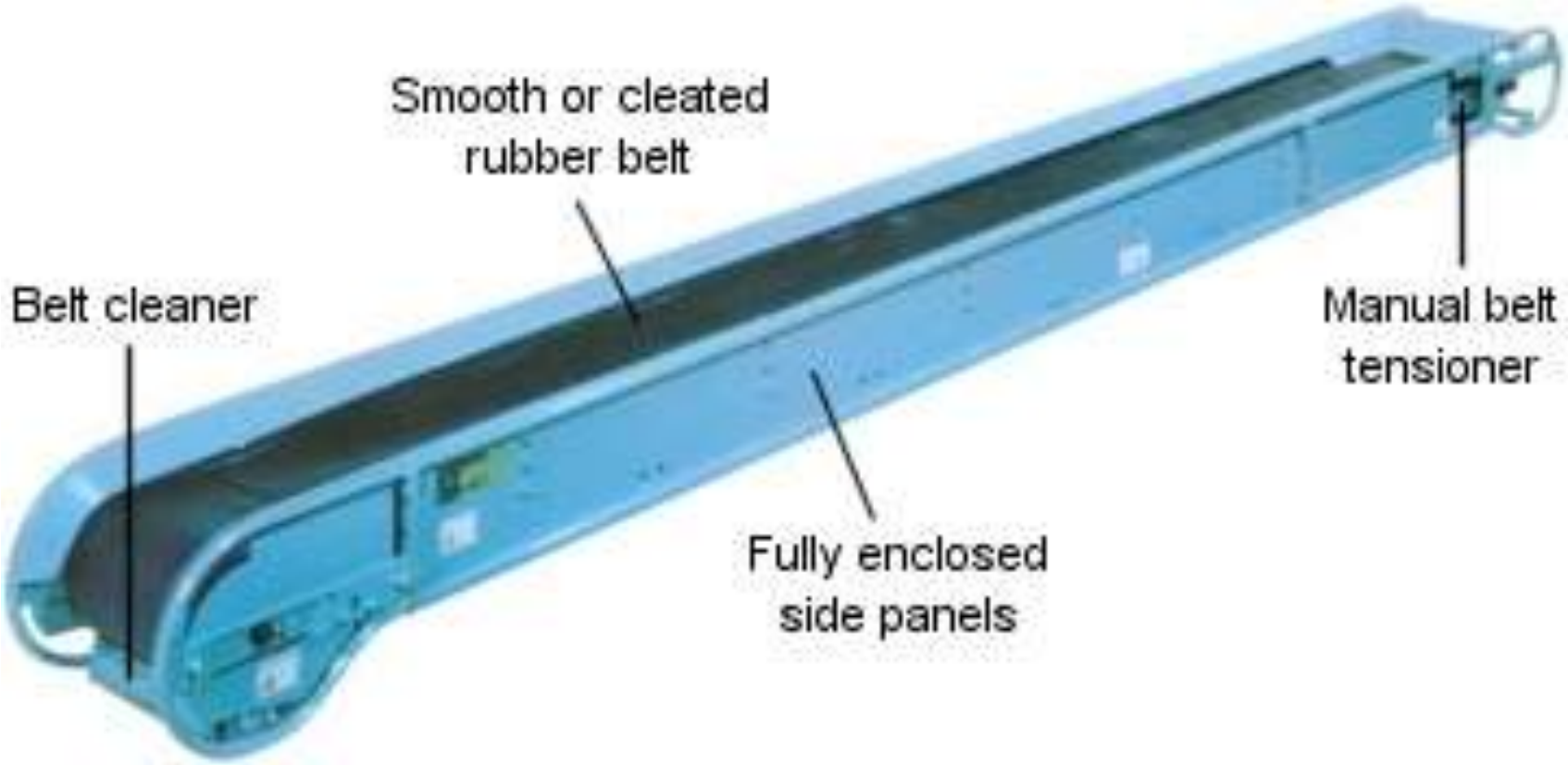


•SCREW OPERATED SLIDE GATE

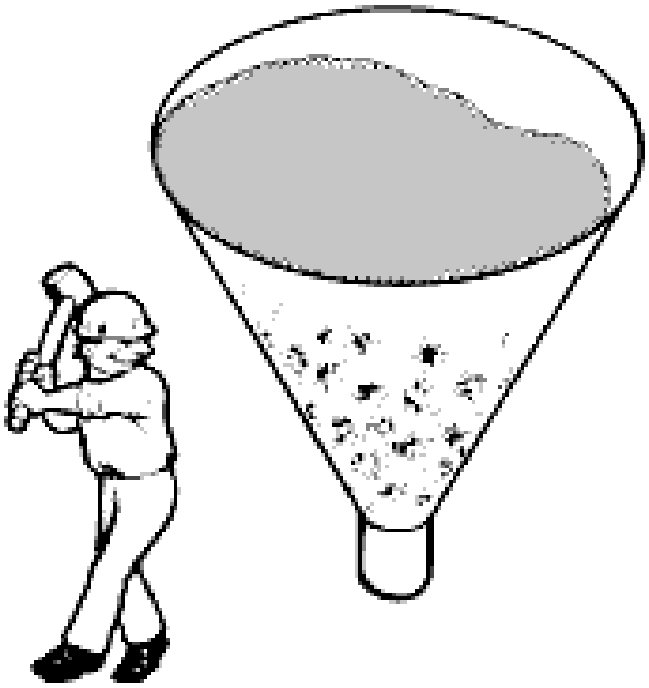
An alternative to the rack and pinion type of slide, operated from one end. This type can also be applied to a sloping outlet and has a mechanical advantage over a hand operated type.

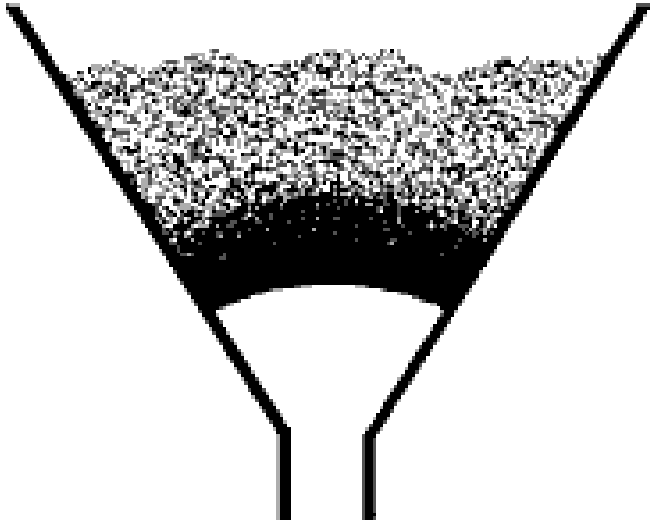
- •MANUAL HANDWHEEL (TYPE SCH)
- •MANUAL CHAINWHEEL (TYPE SCC)
- •AUTOMATIC MOTORISED (TYPE SCM

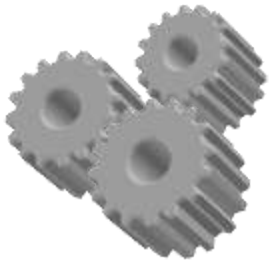



Smooth or cleated
rubber belt
Belt cleaner
Manual belt
tensioner
Fully enclosed
side panels

MR Troughed Belt Conveyor

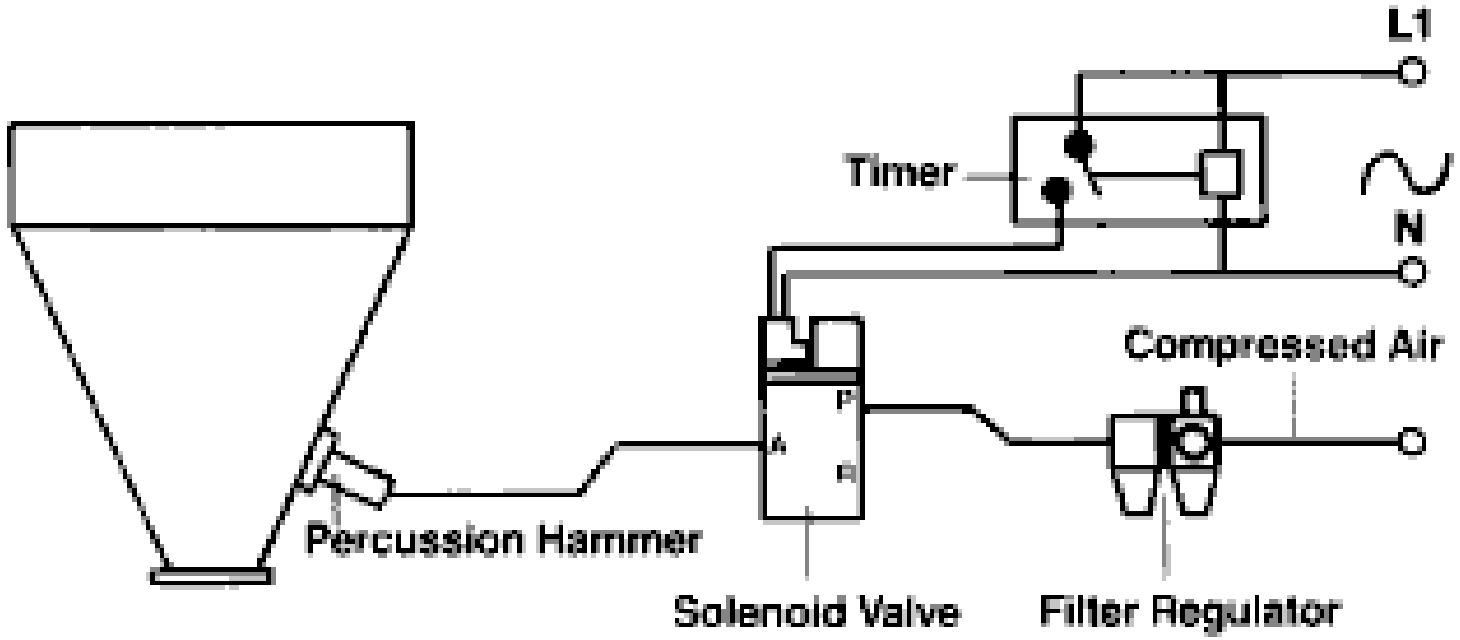




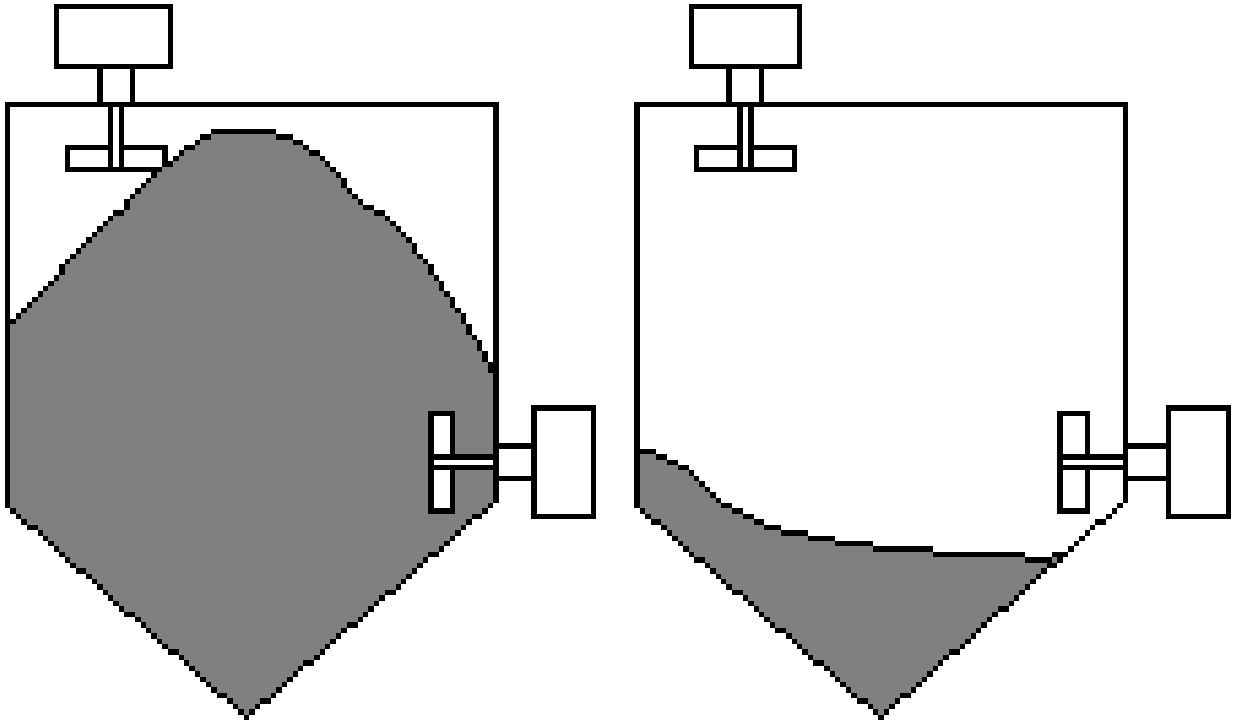


Vibropercussion units are ideal for fitting to Steel Silos, Hoppers, Bins, Chutes & Pipes in fact any steel enclosure that holds or contains the movement of Bulk Materials.

Typical Pneumatic Arrangement

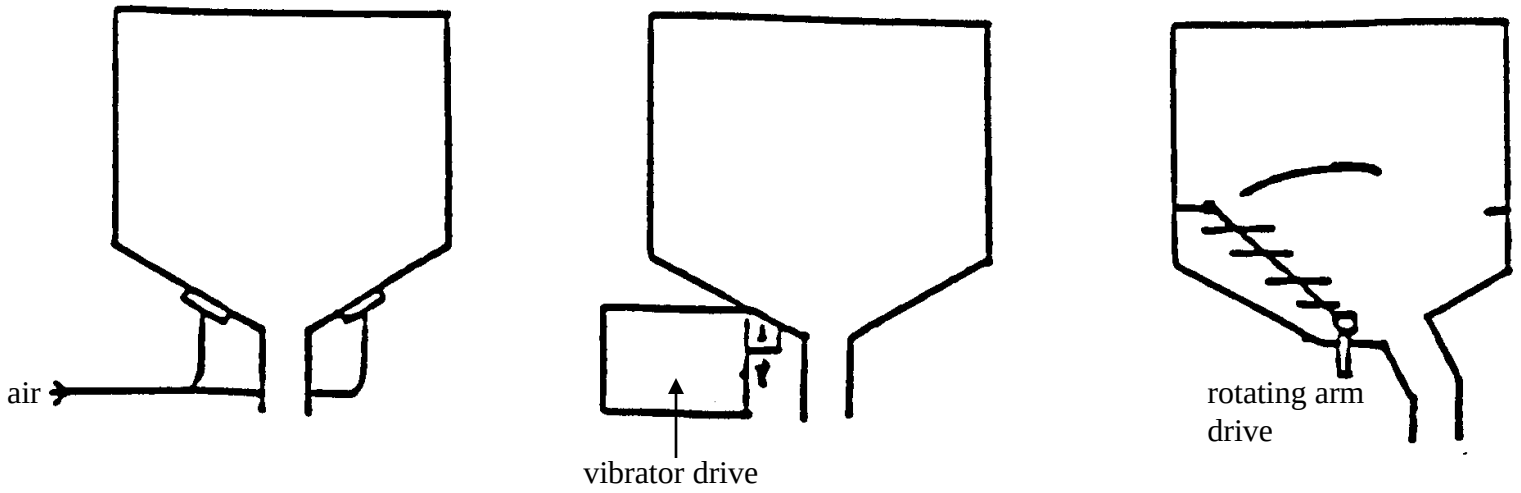


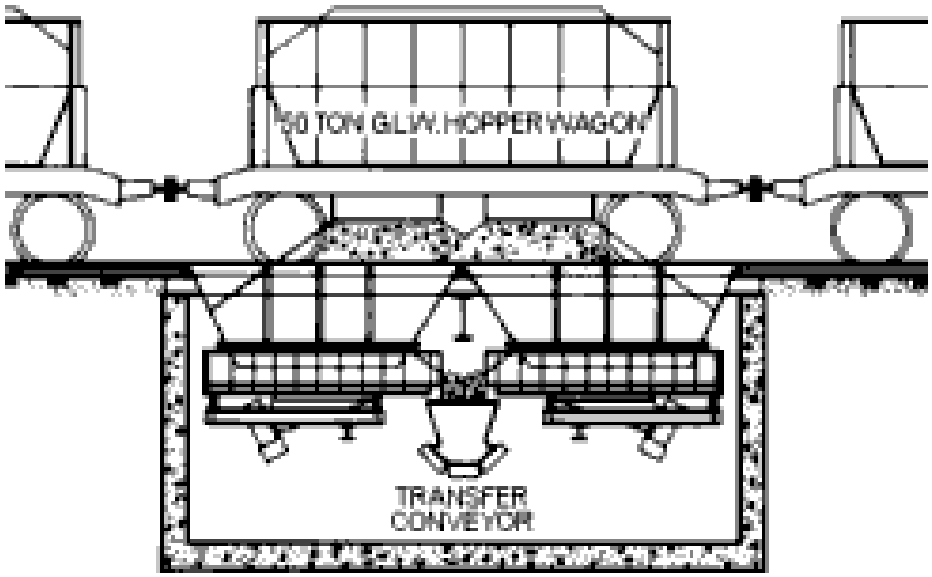
The Paddle Level Indicator is designed to signal the presence, or absence, of bulk materials such as chemicals, chips, granules and powders. It is ideal for bunkers, hoppers and silos as well as for blockage detectors in conveyor chutes. A rotating paddle achieves the detection of the material.



Bins and hoppers

Anti-bridging devices




60 TON GLW. HOPPER WAGON
TRANSFER
CONVEYOR