SEED DRILL

Seed drill is a machine used for placing the seeds in a continuous stream in furrows at uniform rate and at controlled depth with an arrangement of covering the seeds with soil. According to the power source used , seed drills may be classified in to (i) Bullock drawn seed drills (ii) Tractor drawn seed drills.. According to the type of seed metering done animal drawn seed drills may be classified into i) manually metered seed drills and ii) mechanically metered seed drill. . In manually metered seed drills a person drops the seeds in the furrows, in mechanically metered seed drills a mechanical device called seed metering mechanism is used to meter the seeds. There are many designs of bullock drawn seed drills and tractor drawn seed drills which are used for sowing..



Gorru



Bullock drawn seed drill



Tractor drawn seed drills



Tractor drawn seed drills

Functions of a seed drill:

Seed drill performs the following functions

i) To carry the seeds.

ii) To open furrows at uniform depths

iii) To meter the seeds

iv) To deposit the seeds in furrows in an acceptable pattern

v) To cover the seeds and compact the soil around the seed.

SEED CUM FERTILIZER DRILL

Seed drills fitted with fertilizer dropping attachments are called seed-cum-fertilizer drills, They deliver both the seeds and fertilizers simultaneously in an acceptable pattern. Seed cum fertilizer drill has a large seed box which is divided lengthwise into two compartments, one for seed and another for fertilizers distribution.

Functions of a seed cum fertilizer drill :

Seed cum fertilizer drill performs the following functions

vi) To carry the seeds and fertilizer in separate compartments.

vii) To open furrows at uniform depths

viii) To meter the seeds and fertilizers

ix) To deposit the seed and fertilizer in the furrows in an acceptable pattern

x) To cover the seed and fertilizer and compact the soil around the seed.





Seed-cum-fertilizer drill

COMPONENTS OF A SEED DRILL

A seed drill with mechanical seed metering device mainly consists of:

(i) Frame (ii) Seed box (iii) Seed metering mechanism (iv)drive transmission system v) Furrow openers (vi) Covering device (vii) clutch viii) hitch frame and ix) Transport wheels.

Frame

The frame is usually made of mild steel angle section and flats . It is strong enough to withstand all types of loads in working condition. All other parts of a seed drill are fitted to the frame

Seed box

It is a box like structure made up of either mild steel or galvanized iron and provided with a lid. In some designs a small agitator is provided at the bottom of the box which agitates the seeds while the drill in operation and prevents clogging of seeds. Seed metering mechanism is placed at the bottom of the box.

Seed metering mechanism

The mechanism which picks up seeds from the seed box and delivers them in to the seed tube is called *seed metering mechanism*. Seed metering mechanism may be

of several types: (a) Fluted feed type (b) Internal double run type (c) Cup feed type (d) Cell feed type (e) Brush feed type (f) Auger feed type (g) Picker wheel type and (h) Star wheel type. Usually seed metering mechanism is provided at the bottom of the box.

Drive transmission system

The drive transmission mechanism consists of a wheel, sprocket-chain assembly and a driven shaft thatcarry the seed picking discs. When the seed drill moves in the field, the drive

wheel rotates due to its contact with soil and the sprocket wheel also rotes. The chain connecting the drive wheel sprocket and driven wheel sprocket rotates the shaft carrying the seed metering discs.

Furrow openers

These are the parts which open up furrows in the soil for placing the seeds. Different types of furrow openers in use namely 1. Hoe type 2. Shoe type 3. Stub runner type 4. Full or curved runner type 5. Single disc type 5. Double disc type etc. In cultivator type seed drills the tines work as furrow openers.

Covering device or furrow closer

It is a device which closes the furrow with soil after the seed has been dropped in it. Covering the seeds is usually done by chains, bars, packers, rollers or press wheels, designed in various shapes and .sizes

Transport wheel

There are two wheels fitted on an axle for transporting the drill on roads. Iron wheels are used as transport wheels . Some manufacturers use pneumatic wheels. One of the transport wheels is fitted with a suitable attachment to transmit the motion of the wheel to the seed metering mechanism when the drill is in operation.

TYPES OF SEED METERING MECHANISMS

Some of the seed metering mechanisms used in seed drills are explained here.

(a) Fluted feed type

The fluted wheel also known as fluted roller is driven by a square shaft. There are horizontal groves provided along the outer periphery of the wheel and wheel can be shifted sideways depending upon the seed rate. These rollers are mounted at the bottom of the seed box. They receive the seeds in the longitudinal groves and pass on to the seed tube through the seed hole..

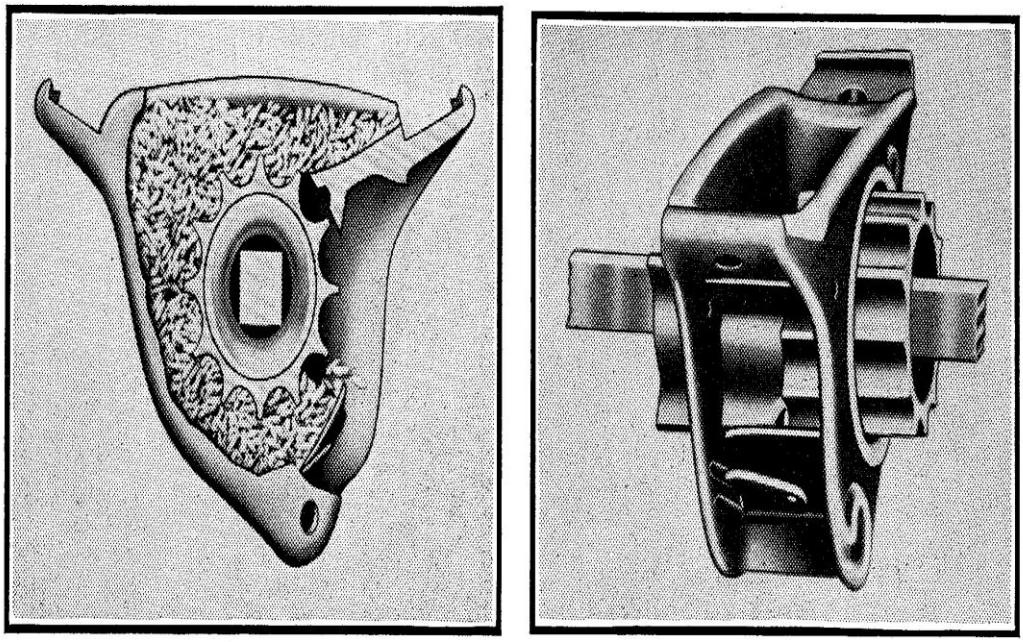
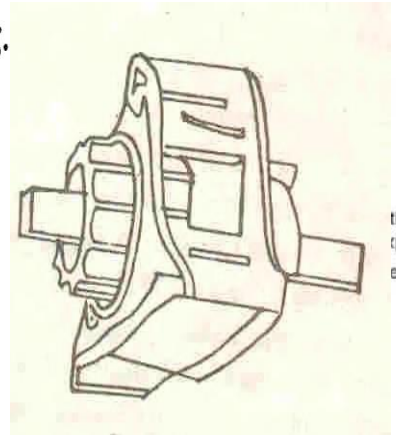
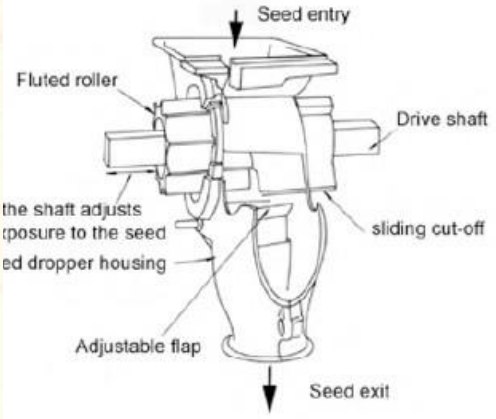


Fig.





Fluted feed type seed metering mechanism

(b) Internal double run type

The internal double run feed mechanism has a double face wheel. One face has a larger opening for course seeds while other face has smaller openings for small seeds. Flapper gate is provided at the bottom of the box which covers the opening not in use. The rate of seeding is controlled by changing the speed of the internal feed wheels. This is done by meshing appropriate gears.

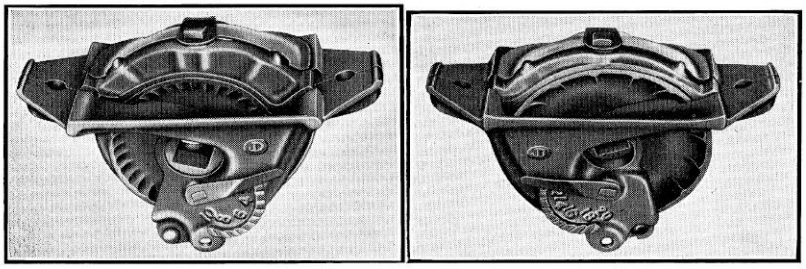


Fig. 11.8. Internal double-run seed-metering device, showing large and small sides of the wheel, for large or small seeds. (Deere & Co.)

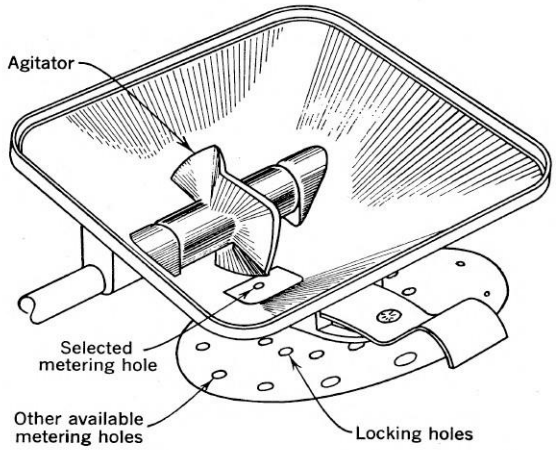
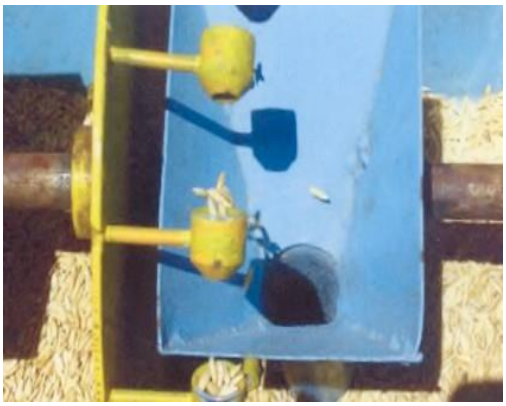


Fig. 11.9. Stationary-opening seed-metering device with agitator, as employed on some vegetable seeders (hopper not shown).

Internal double run

(c) Cup feed mechanism

The mechanism consists of a circular shaft mounted with many circular discs. Each disc is provided with several cups or spoons in a circular path...This arrangement is kept at the bottom of the seed box. When the shaft rotates, the discs also rotates. Seeds are picked up by the cups and then dropped in to a funnel from where the seeds travel through the seed tube and reach the furrows. The cups have two faces, one for larger seeds and the other for smaller seeds



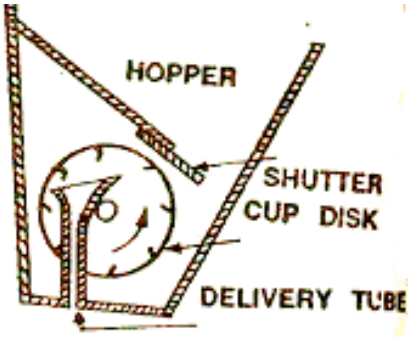


Fig 8. Cup feed mechanism

(d) Cell feed mechanism - It is a mechanism in which seeds are collected and delivered by a series of equally spaced cells engraved on the periphery of a circular plate or wheel

(e) Brush feed mechanism - It is a mechanism in which a rotating brush regulates the flow of seed from the hopper in to the seed tube. A number of bullock drawn planters in the country use brush feed mechanism.

(g) Picker wheel mechanism - It is a mechanism in which a vertical plate provided with radially projected arms picks up and drop the seeds in to the furrow. It is suitable for large size seeds like potatoes..

(h) Star wheel mechanism - It is a feed mechanism which consists of a toothed wheel, rotating in a horizontal plane and conveying the fertilizer through a feed gate below the Star wheel.

(f) Auger feed mechanism - It consists of an auger which moves the substance from the container and delivers in to the field uniformly. Fertilizer drills are usually provided with auger feed mechanism. Some manufacturers use this mechanism in seed drills also.

TYPES OF FURROW OPENERS

The furrow openers are provided in a seed drill for opening a furrow. The seeds travel through the seed tube and reach the furrow

Different type of furrow openers are: in use (1) Shovel type (2) Shoe type (3) hoe type 4) Disc Type (single disc, double disc).etc

(1) Shovel Type

Shovel type furrow openers are widely used in seed drills. There are three types of shovels in use. They are: (a) reversible shovel (b) single point shovel and (c) spear head shovel.

Shovel type openers are best suited for stony and root infested fields. The shovels are bolted to the shanks at their bottoms. Boots are fitted at the back of the shovels which carry the delivery ends of the seed tubes. In cultivator type seed drills shovel type furrow openers are used.

(2) Shoe Type

It works well in trashy soils where the seed beds are not smoothly prepared. They are made from two flat pieces of steel welded together to from a cutting edge. It is specially suited for black soils. Bullock drawn three tyne seed drills are provided with shoe type furrow openers.

(3) Disc Type

They are two types: (a) Single disc and (b) Double disc types.

Single disc type

Disc type furrow openers are suitable to fields where plant residues or trashes are used as mulches. It consists of a curved disc made of hardened steel. It is set at an angle which while working shifts the soil to one side making a small furrow. Seeds are placed in the furrows. The disc is kept clean by two scrapers, one toe shaped at the convex side and one 'T' shaped at the concave side. It works well in sticky soils also, but the discs are costly and maintenance is bit difficult.

Double disc type

In double disc furrow opener there are two flat discs, set at an angle to each other. The discs open a clean furrow and leave a small ridge in the center. The seeds are dropped between the two discs, providing more accurate placement. It is suitable for trashy lands. Seed drills operated at high speeds, usually use this type of furrow openers.

Seed tube - Seed tubes are provided at the lower end of the feed cups. They conduct seeds from feed cups to the furrow lines through suitable boots and furrow openers Polypropylene, rubber and steel tubes are used as seed tubes.. Minimum diameter of seed and fertilizer tube is 25 mm.

Boot - It is a part of the sowing equipment which receives the seeds or fertilizers from the seed tube and delivers to the furrow. It is made up of cast iron or mild steel.

TYPES OF FURROW CLOSERS

Drag chain, drag bars, scraper blades, steel press wheels, zero- pressure pneumatic press wheels, disc hillers and various combination of these are used as furrow closers.

CALIBRATION OF SEED DRILL

Laboratory testing of a seed drill to determine the rate of seed delivery is called calibration of a seed drill. This is done to ascertain whether a seed drill delivers the seed in accordance with the recommended seed rate or not. If any discrepancy is found between seed delivery of the drill and the recommended seed rate, then the seed metering mechanism is adjusted to deliver correct seed rate. This method avoids the difficulty of setting the seed delivery rate of the seed drill in actual field conditions.

Procedure

i. Determine the width of sowing of seed drill (W)

W = M x S, metre

Where,

M = number of furrow openers

S = Spacing between the furrow openers, meter

ii. Find the length of the strip of land (L) for an area of 1/25 ha taking the width of sowing as cover 1/25 ha

L = (1 /25) x 10000 m^2) x 1/ w , meter

= 400/W

iii. Determine the number of revolutions (N) of the ground wheel of the seed drill required to cover a strip of length L meter

L = □ x D x N = 400/W metre

N = 400 □ x D / W revolutions per minute

iv. Jack the seed drill so that the drive wheel turn freely. Make a mark on the drive wheel and a corresponding mark at a convenient place on the body of the drill to help counting the revolutions of the drive wheel

v. Fill the seed in the seed hopper. Place a container under each boot for collecting the seeds dropped from the hopper

vi. Set the seed rate control adjustment for maximum position and mark this position on the control for reference

vii. Engage the clutch and rotate the ground wheel for N revolutions
(N = 400 Π D / W)

viii. Weigh the quantity of seed collected in the container and record the observation W_s kg

ix. Calculate the seed rate in kg/ha

Calculation:

Seed collected for an area of 400 m^2 = W_s kg

Seed rate per hectare $= \frac{10000 x Ws}{400}$ kg/ha

x. If the calculated seed rate is higher or lower than the desired rate of selected crop, repeat the process by adjusting the seed rate control adjustment till the desired seed rate is obtained.