Yantropakarnani-1(Modern Machinery)

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Programme Objectives	Course Objectives
PO1- Demonstrate comprehensive knowledge and application of the Trisutra concept to explore root causes, identify clinical manifestations of disease to treat ailments and maintain healthy status.	**CO1**
PO2- Demonstrate knowledge and skills in Ayurveda, acquired through integration of multidisciplinary perspectives and keen observation of clinical and practical experiences.	**CO5**
PO5- Demonstrate knowledge, skills and attitudes to provide holistic quality care and preparedness to practice.	
PO7-Demonstrate self-directedness in pursuit of knowledge and skills, which is required for advancing health care and wellbeing of society.	
PO8-Demonstrate the ability to effectively communicate with patients, families, community and peers	
PO9- Demonstrate an understanding of qualities and required skills as a practitioner, researcher and academician and an aspirations to become one.	

Specific Objectives

Choose and record contemporary machines used in Ayurvedic drug preparation.
Discuss the pharmaceutical use of Distillation apparatus, Ball Mill, Pulveriser, End Runner, Edge Runner, Tablet compression machine, Capsule filling machine, Pouch filling machine, Liquid filling machine in Ayurvediya Aushadhi Nirmana
Describe the principles behind construction and working of the classical Yantras used for Ayurvediya Aushadhi nirmana.
Enlist categorical information about the following Yantras in the charts- Ulukhal Yantra, Patan Yantra, Jarana Yantra, Patala Yantra and Swedana Yantra.
Interpret the mechanism and effect of Yantras / machines on the Physical and Chemical properties of the drug material.

Disintegrator and Pulveriser

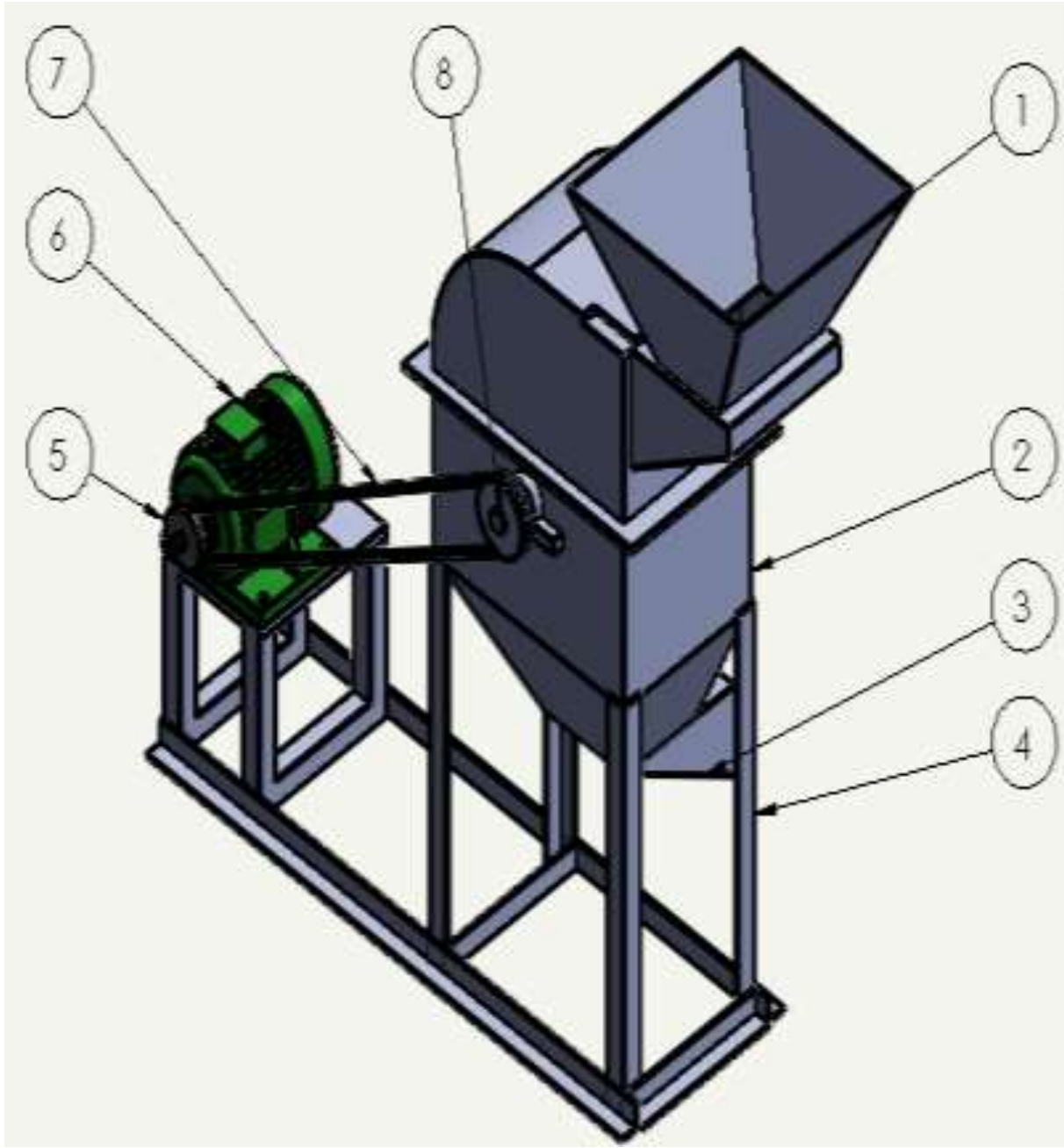
Principle

A disintegrator and a pulveriser both operate on the principle of applying mechanical force to break down large particles into smaller ones through impact, shear, and compression forces, but a disintegrator typically focuses on coarse breaking of materials into larger pieces, while a pulveriser further refines those particles to a much finer powder by utilizing high-speed rotating elements to create intense shearing and impact actions.

- **Disintegrator:**
- Uses rotating blades or hammers to forcefully break down large chunks of material into smaller pieces.
- Often used as a pre-processing step before further grinding in a pulverizer.
- May have a larger screen to allow for larger particle sizes to pass through.

- **Pulverizer:**

- Employs high-speed rotating elements like beaters or grinding mills to achieve very fine particle sizes.
- Utilizes a combination of impact, shear, and friction forces to break down particles.
- Typically has a finer screen to separate the desired fine powder.



ITEM NO.	PART NUMBER	QTY.
1	HOPPER	1
2	CRUSHING CHAMBER	1
3	OUTLET	1
4	FRAME	1
5	PULLEYS	2
6	ELECTRIC MOTOR	1
7	BELT	2
8	MAIN SHAFT	1


Air Outlet
Hopper
Mild Steel Body
Pulley
Motor
Material Outlet
Blower
Area for Placing Motor

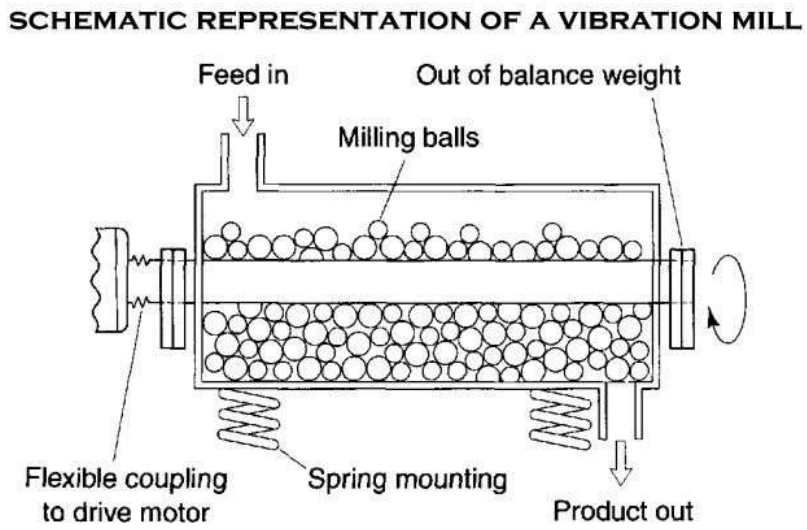
Similarities

Both are machines that reduce the size of materials.
Both can be used to create fine powder or small particles.
Both are used in industrial or manufacturing settings
Both involve mechanical processes to break down materials.
Both are used to make materials easier to handle or transport.

Differences

Disintegrator	Pulveriser
are designed to break down materials into smaller pieces.	Intended to crush or grind materials into powder or small particles.
use high-speed rotating blades or hammers to break down materials.	use grinding plates or rollers to crush materials.
often used for tougher materials like rocks or minerals.	used for softer materials like food or chemicals.
are typically larger and more powerful.	Less powerful due to the nature of the material, they handle.
used in a wider range of industries, including mining and construction.	more commonly used in food processing and pharmaceuticals.

Ball Mill



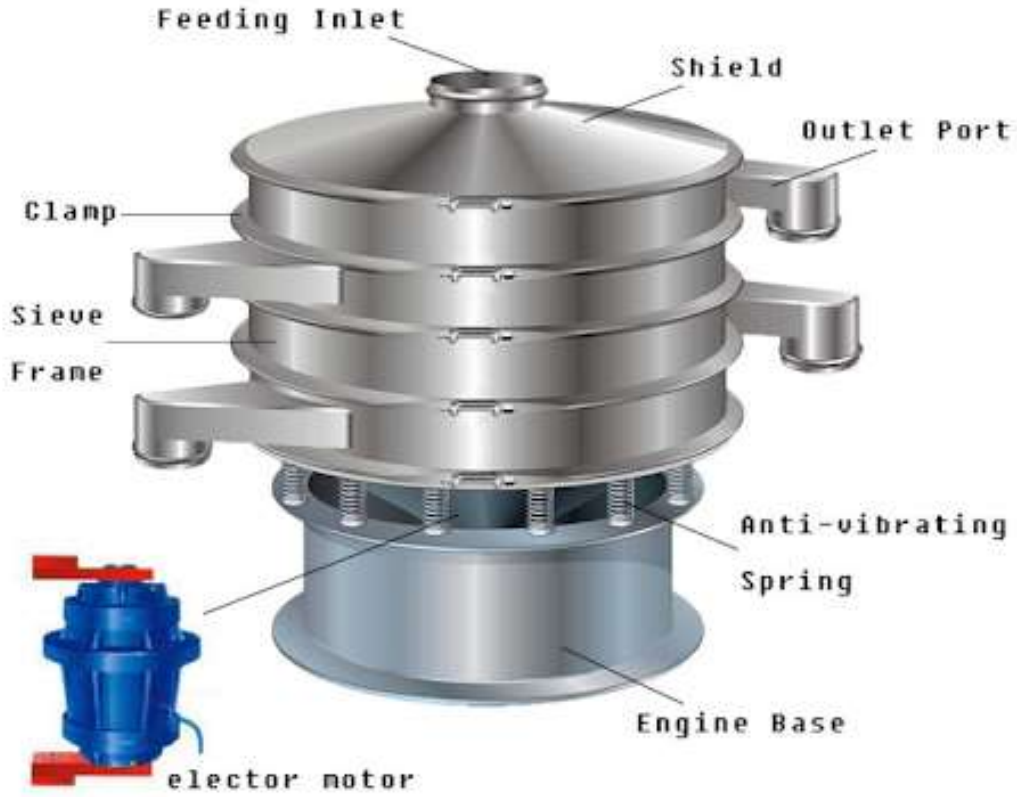
A ball mill is a grinding machine that uses steel or ceramic balls to break down materials into a powder.

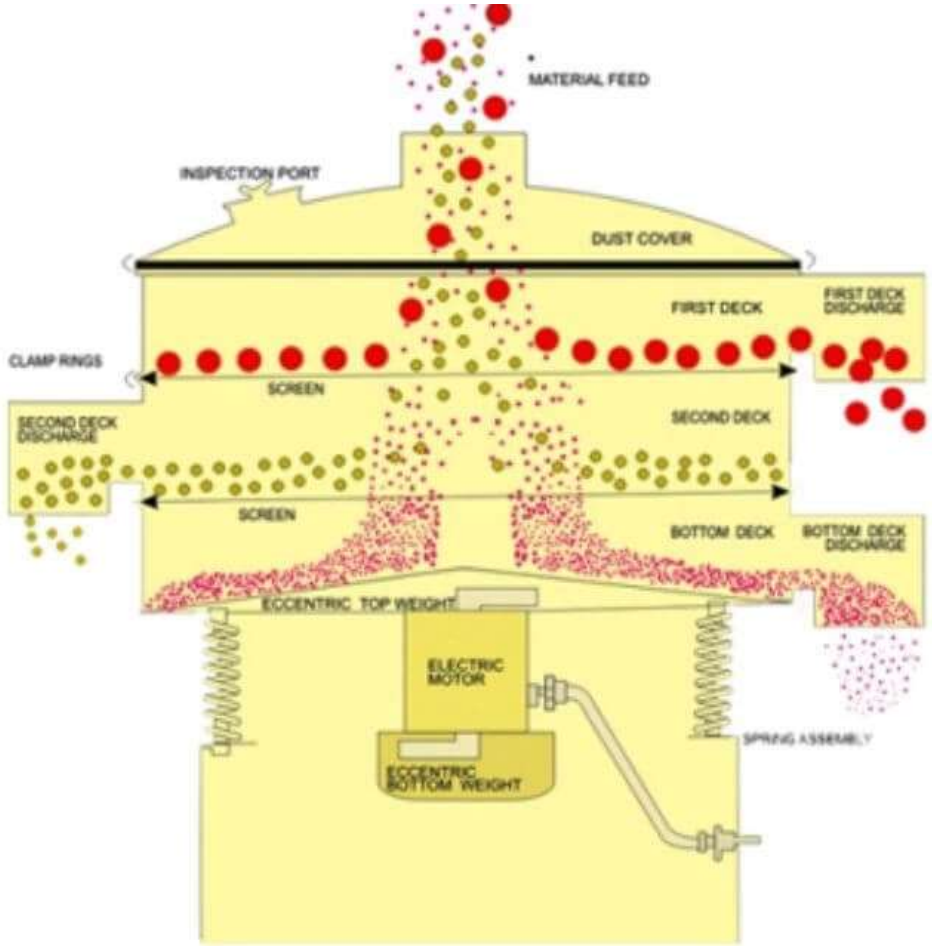
Ball Mill

- **Principle**
- Uses impact and attrition to break materials into smaller pieces. The process involves lifting grinding media, like steel balls, and dropping them onto the material. The balls then rub against each other and the material, breaking it down.

- **Uses**
- Ball mills can be used for wet or dry grinding.
- can also be used to blend materials, mix materials.
- Ball mills are used to grind ores and minerals into smaller particles.

Mechanical Sifter





Mechanical/ Vibro- Sifter

The Mechanical Sifter is a machine used for sifting, grading and screening of powders or granules based on their size and shape.

Principle

Vibratory motion created by an eccentric weight or motor, which agitates the powder on the sieve and allows the particle pass through based on their size.

Types

- Single deck sifters
- Multideck sifters
- Inline sifters
- Lab-scale sifters

Parts of Mechanical sifter

- The motor is the part that powers the vibro sifter
- The hopper lid is the topmost part of the machine that helps in containing the materials to prevent them from falling while the machine is vibrating.
- Filter screen helps in ensuring the materials have a smooth finish during the processing period.
- Wire Mesh Screen Ring offers support to the mesh making it durable.
- Over-sized material outlet acts as a valve that releases remnants of the sieving process.
- Screened material outlet functions as a valve that releases sieved products like sized granules for further processing.
- Vibrating springs offer the hydraulic movements of the machine allowing it to vibrate freely.
- Control panel consists of various buttons that aid in controlling the workings of the machine

Tablet Compression Machine

- **Principle**

A tablet compression machine uses hydraulic pressure to compress powdered material into tablets. The process involves several stages, including filling, metering, compression, and ejection.

Steps in tablet compression

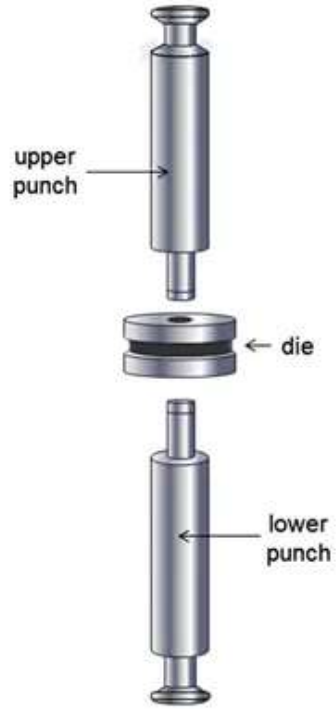
1.Filling: Powder is fed into the die cavity from a hopper.

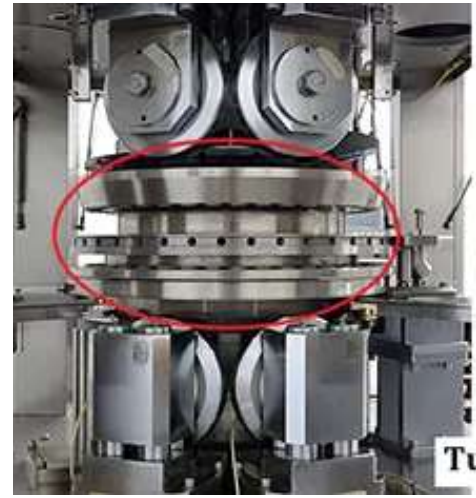
2.Metering: The amount of powder entering the die cavity is controlled to ensure uniform tablet weight.

3.Compression: The upper and lower punches come together to compress the powder.

4.Ejection: The lower punch rises to eject the tablet, which is then guided out through the discharge chute.


Hopper


upper punch
die
lower punch




Turret


Discharge Chute
FALCON

Parts of a Tablet Compression Machine

1. **Hopper**: The hopper holds the powdered or granulated material that will be compressed into tablets. It provides a steady flow of material into the machine.

2. **Feeder**: The feeder controls the flow of material from the hopper into the compression zone. It ensures consistent and accurate dosing of the material.

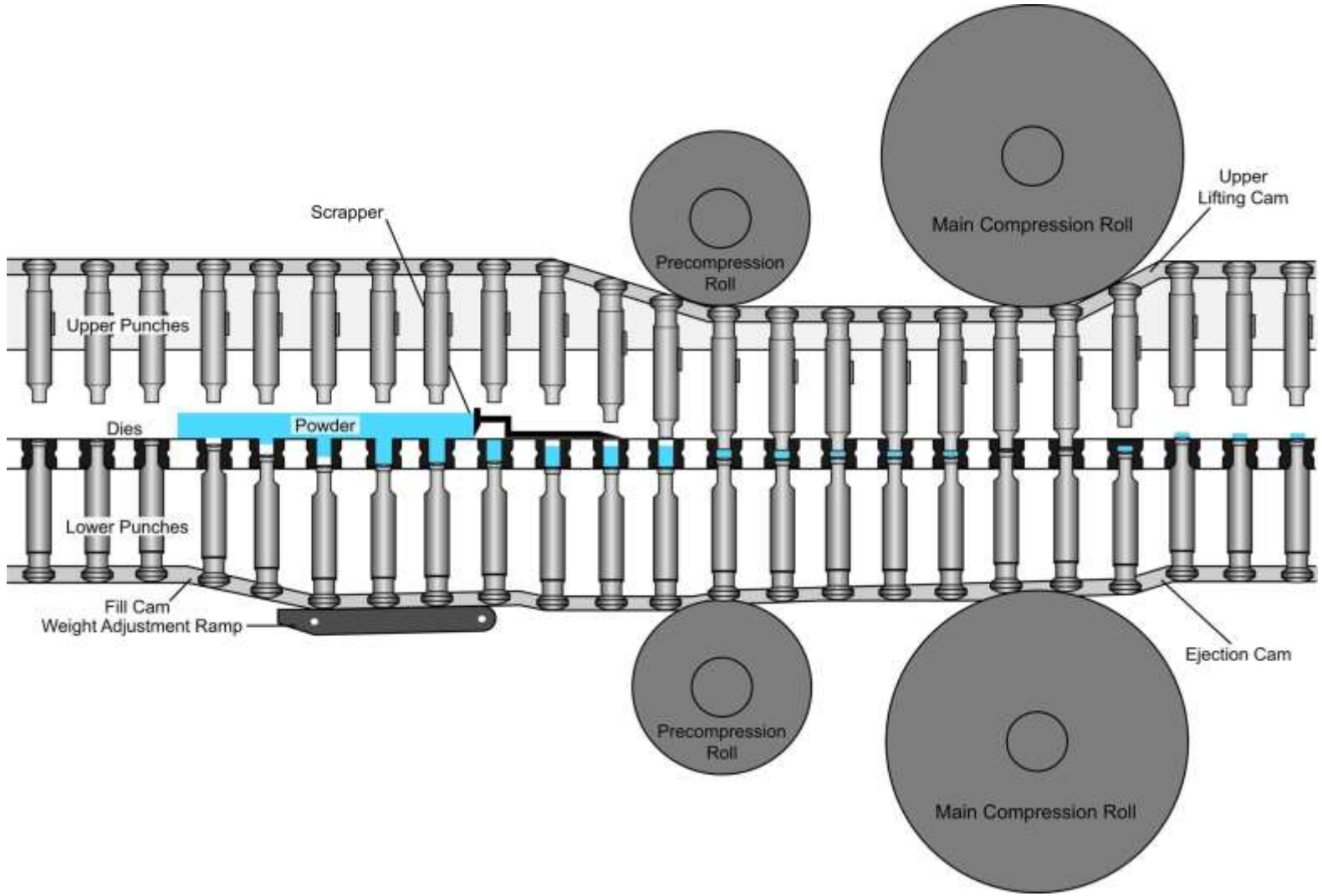
3. **Die**: The die is a cavity with a specific shape and size that determines the final tablet's dimensions. It is responsible for shaping the material into tablets.

4.Punches: Punches are upper and lower components that compress the material inside the die to form tablets. They apply force and create the desired tablet shape.

5.Cam Track: The cam track controls the movement of punches during the compression process. It determines the speed, depth, and dwell time of the punches.

6.Compression Zone: The compression zone is where the material is compressed between the punches to form tablets. It requires precise control of force and speed.

7.Ejection System: The ejection system removes the finished tablets from the compression zone and transfers them to subsequent processes or packaging.


Scrapper
Precompression Roll
Main Compression Roll
Upper Lifting Cam
Upper Punches
Dies
Powder
Lower Punches
Fill Cam
Weight Adjustment Ramp
Ejection Cam
Precompression Roll
Main Compression Roll

Pills making machine

Pill cutting machine

Stick Making Machine

Uses

- **Uniformity**: The machine ensures that each pill is of uniform size and weight, which is important for dosage accuracy.
- **Non-Heat Process**: Unlike tablet compression, pill rolling machines typically don't apply heat, which makes them suitable for delicate herbs that might lose potency if exposed to heat.
- **Small Scale Production**: These machines are often used in small-scale production, making them suitable for Ayurvedic practitioners and manufacturers who focus on traditional medicine production.

Advantage of Pill making machine

- **Traditional Method Preservation**: It keeps the traditional Ayurvedic practice of pill formation intact while automating the process to increase efficiency.
- **Customizability**: The machine can be adjusted to produce pills of various sizes, shapes, and weights.
- **Minimal Processing**: Since the rolling process does not involve the application of heat or chemicals, it helps in preserving the integrity of the active ingredients.

Assessment Questions

- What are parts of Disintegrator?
- What is the difference between Pulverizer and Disintegrator?
- Which machine is used for fine Powdering?
- What is the use of Mechanical Sifter?
- Pill making machine is used for making which Kalpana in Ayurveda?
- Punches and Dies are parts of which machine?

Thank You