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### Roll Mill

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ROLL MILL  
Charles E. Vaughan <sup>1/</sup>

The roll mill uses a difference in surface texture and shape of the seed to make a separation. The roll mill is always used after the basic cleaning machines in the processing line. It is often used to finish lots that contain dodder, dock, flat or immature seed and inert matter that passed the previous machines.

The rough seed are separated from the smooth seed by the action of the rolls. A pair of rolls covered with a velvet like material are placed side by side close enough to touch lightly. The rolls are mounted in an inclined position and turn in opposite directions, outwardly when viewed from the top. By the action of the rolls the rough seed are lifted out of the smooth seed and discharged separately.

No matter what roll mill is chosen, the parts and operation of the machine are practically the same.

Component Parts

Feed Hopper. The feed hopper is that part of the machine that receives the seed yet to be cleaned from the elevator or from some other means. From the feed hopper the seed are fed into the machine for the cleaning operation. At the bottom of the feed hopper there is a vertical shaft through which the seeds flow. From this shaft, individual feed spouts lead directly to each pair of rolls. This vertical shaft is equipped with a fast, complete clean-out pull slide.

Rolls. The rolls are the separating parts of the machines. They are covered with a velvet-like material and are placed side by side close enough to touch lightly. The rolls are always used in pairs and each pair of rolls is a separate cleaning unit.

The length of the rolls may vary with different machines, as a certain length is not absolutely necessary for maximum cleaning. The number of rolls may also vary from machine to machine. An increase in the number of rolls does not increase efficiency but merely increases capacity. The number of pairs of rolls may vary from one to ten depending upon the capacity desired.

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Tilt Mechanism. The tilt mechanism is located at the bottom of the feed end of the machine. On some machines it is a large hand wheel screw; whereas, on other machines it is a combination lever-screw device. This variable tilt mechanism permits quick, easy adjustment of the machine's pitch for various types of seeds. A continuous incline range from  $7^{\circ}$  to  $13^{\circ}$  may be obtained.

Baffles. The baffles are shields that conform fairly close to the shape of the rolls as viewed from the top. A baffle is placed directly over each pair of rolls for the purpose of deflecting the seed being thrown over, back against the rolls. This causes the rough seed to move very rapidly to the outside. The baffles are independently adjustable at either end of the machine. The range of separations possible may be increased by changing the distance between the rolls and the baffles.

Variable Speed Drive or Speed Control Mechanism. The speed control mechanism is an important part of the machine, because the speed of the rolls is one of the most important adjustments. This part of the machine is located at the discharge end of the machine. By changing a variable speed drive, or changing the size of one pulley in relation to the size of another, the speed of the rolls can be accurately controlled. Either belts or chains are used to turn the rolls.

### Operation

The seed mixture is fed onto the rolls at the high end of the machine. As the seed travel downhill between the revolving, inclined rolls, the rough seed are caught by the velvet-like rolls and thrown against the baffles, deflected back against the rolls, etc., until they have been thrown out. The smooth seed continue bouncing downhill between the rolls and discharge off the end. The seeds thrown over the sides are caught in graduated grade hoppers underneath the machine. The grades of seed from these hoppers vary from a high percentage of rough seed from the one nearest the feed end of the machine, to a very low percentage of rough seed from the one nearest the discharge end. The intermediate grades can be re-run to recover the smooth seed that were thrown out with the rough seed.

### Adjustments

1. Rate of feed. The rate of feed is adjusted and controlled for two reasons. First, the effectiveness of the separation may be controlled somewhat by the rate of the feed. If the space between the rolls and the baffles becomes crowded the agitation that is necessary to make an effective separation is reduced or prevented. Second, the capacity may be increased by opening the feed slide.

This adjustment is made by opening or closing the feed slide in the vertical shaft underneath the feed hopper. This increases or decreases the size of the opening in the shaft, through which the seeds flow into the individual feed spouts.

2. Speed of the rolls. The most important adjustment is the speed of the rolls which is controlled by the hand wheel at the end of the motor base. In general, the faster the rolls revolve, the cleaner the seed. However, too fast a speed is not recommended, because it results in unnecessary throw-over of good seed. The recommended way of making the adjustment is to start with a minimum speed and the desired rate of feed, then increase the speed of the rolls until the product is clean.

3. Variable tilt mechanism. This adjustment is used less by most operators once a desirable tilt has been established. To increase the tilt has the effect of shortening the rolls. This also reduces the amount of throw-over.

4. Height of baffles. The baffle adjustment is used primarily to widen the range of separations possible. For most cleaning problems, a 1/4 inch spacing seems to be best. The baffles are independently adjustable at either end of the machine. However, all the baffles are adjusted at one end at the same time and have the same spacing.

#### Common Separations

Below are listed a few rough-coated seeds and objects which are thrown out by a roll mill.

Dodder	Catchfly	Wild Winter Peas
Mustard	Cockle	Wild Carrot
Foxtail	Timothy	Clay or Stones

These rough-coated seeds or objects may be removed from clovers, alfalfa, hulled lespedeza, hairy vetch and other smooth-coated seeds. Because of its triangular shape and sharp corners, dock is commonly and easily removed from the clovers.

The removal of buckhorn can be accomplished with this machine if prior treatment has been given the seed lot containing buckhorn. This prior treatment involves adding a foreign material, such as wood dust, to the moistened buckhorn seed. Separation is then an easy matter.

The roll mill is a very economical machine because the cost of operation and maintenance is extremely low. The minimum attention needed to operate the roll mill, once it is adjusted, is also a point to remember when considering this machine.

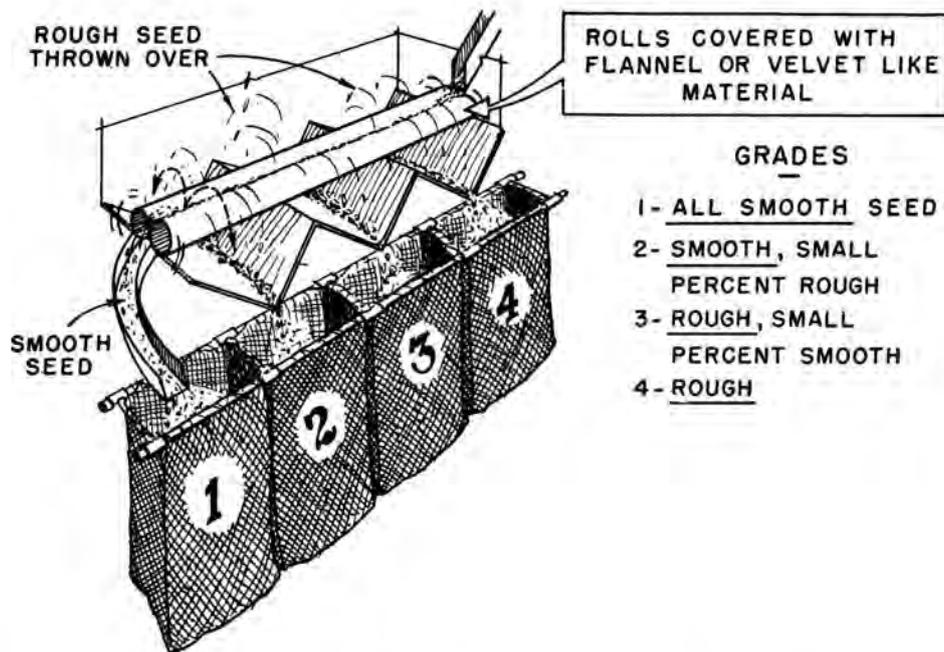


Figure 1. Diagrammatic section of roll mill showing method of operation.