The present invention relates to roughage mills and more particularly to an attachment for a roughage mill for increasing the capacity and efficiency of a roughage mill.

One of the objects of the present invention is to provide a novel and improved device which may be made in the form of an attachment for a roughage mill for separating certain of the materials from certain other of the materials passing through the mill, such as for example, separating the heavier materials from the lighter materials and permitting only the heavier materials to pass through the grinding mechanism for further reduction.

A further object of the invention is to provide a novel and improved attachment for a roughage mill which will separate grain, corn or heavier materials from the lighter materials as the same is passing through the roughage mill and thereby reducing the amount of material that is required to pass through the grinding mechanism.

A further object of the invention is to provide a novel and improved attachment for a roughage mill which will separate certain of the heavier material from the lighter material so that only the heavier material will pass through the grinding mechanism of the roughage mill, to thereby increase the capacity of the roughage mill manyfold.

A still further object of the invention is to provide an improved separator attachment for a roughage mill which in turn is provided with an adjustable separating mechanism in the form of slatted vanes or baffle plates whereby the same may be adjusted for the purpose for which it is being used so that it may properly separate the heavier materials from the lighter.

These and other objects are accomplished by providing a construction and an arrangement of the various parts in the manner hereinafter described and particularly pointed out in the appended claims.

Referring to the drawings:

Fig. 1 is an end elevational view, partly in cross section of one form of roughage mill, showing my improved separator attachment mounted thereon.

Fig. 2 is a side elevational view partly in cross section, showing the separating attachment per se.

Fig. 3 is a cross sectional view taken on the line 3-3 in Fig. 2.

Fig. 4 is a cross sectional view taken on the line 4-4 in Fig. 2, and

Fig. 5 is a cross sectional view taken on the line 5-5 in Fig. 2.
mounted on suitable bearings on the main frame. The material ground by the grinding mechanism is conveyed through a conduit to the fan casing. The material is conveyed to the fan casing by the fan. The material is conveyed to the fan casing by the fan.

The mechanism above described is substantially identical with the mechanism described in the above referred to co-pending application. For further details as to structure and operation, see above mentioned co-pending application.

The important feature of the present invention consists in a novel method for preparing forage for cattle and a novel device which includes a separating mechanism in the form of an attachment for a roughage mill. This machine is especially adapted for separating kaffer-corn, corn, corn cobs, oats and the like from the lighter material after the material has passed through the cutter head so that only the heavy material (which is the only material requiring further reduction) may be passed through the grinding mechanism. Obviously by separating the lighter material (which heretofore clogged the grinding mechanism), from the heavier material, a substantial increase in the capacity and efficiency of the machine is accomplished.

This attachment comprises a hood-like separator casing which has an enlarged bottom seated on the hopper. The casing gradually tapers toward the upper end thereof and is offset or inclined to one side of the hopper on which it is mounted. Secured on the main shaft 11 of the roughage mill, between the cutter head 12 and the conveyer screw 15 is a fan hub 31 which in turn is provided with fan blades 32 secured to flanges of the hub by means of rivets. This fan 32 is mounted within a casing or housing formed by a partition wall 34 between the conveyer screw 15 and the fan housing and the cutter head 12. Communicating with the fan housing and extending vertically upward in a line tangent with the circumference thereof is an upwardly discharge spout 36. This discharge spout receives and discharges the materials that pass through the fan into the separator hood 30. The upper or top sides of the hood 30 are curved as shown at 37 and inclined at an angle of substantially forty-five degrees (45°) as shown at 38. At spaced intervals along the top 30 of the hood 30 are inwardly extending deflectors 39 which are for the purpose of directing the material against the separating vanes or blades hereinafter described.

Mounted within the hood 30 are three sets of separating vanes or blades which are adjustable from the outside. These separator blades or vanes are indicated generally by the reference character 40. These separating vanes of which there are three in number, are constructed substantially the same except that they are proportionally smaller as the hood or separator casing becomes smaller toward the top. These separating blades or vanes are preferably though not necessarily made of one sheet of material and are transverse forward slats which are normal positioned in the same vertical plane. Three of such slats are positioned horizontally across the front side of each of these separator vanes or blades leaving an opening as shown at 43 on the forward side. Positioned directly across the opening 43 in the vanes are similar horizontal slits or blades in an opening on the rear side as shown at 45. It will be noted that there are just two such horizontal blades on the rear sides of these separating vanes. From the above construction it will be readily seen that as the material is blown upwardly by the fan 32 and directed by the deflector 39 against the separator vanes 40, the separator vanes 40 will strike the slats of these vanes, i.e., either the front ones or the rear ones and then drop downwardly while the lighter material will pass through openings between the slats of the vanes up through the hood 30 into the conduit leading to the fan casing 22. Each of the separator vanes are pivotedly mounted in the opposite sides 46 of the separator hood 30 by means of a bolt and washer 47 on one side thereof and by means of a washer 48 mounted in an aperture 50 in one of the sides of the hood. Each of the separator vanes 40 are provided with downwardly and laterally extending spouts 49 and have their upper ends secured to the vanes by means of bolts or rivets 50 which extend through the washers 46 to the inner side of the vanes. The lower ends of the cranks 49 are pivotally connected as shown at 50 to a bar or connecting rod 51. The lower end of the connecting bar, as shown at 52 is connected to a hand operating lever or rod 53. The hand operating lever or bar 53 may be adjusted to various positions and locks in these positions by clamps 54. From the above description it will be readily seen that these baffles or separator vanes may be simultaneously adjusted by the hand lever 53 for the purpose of accommodating the various types of material passing through the separator.

Connected with the delivery end of the separator casing is an elbow 55 which in turn is connected to a conduit 56. This conduit 56 is connected to a second elbow 57 which in turn is connected to an extension 58 which communicates with the fan casing 22.

The operation of my improved separator attachment for a roughage mill is as follows:

Let us assume that the gate 23 is positioned in place so as to cut off communication between the trough 20 and the conduit 56. The gate or plate 24 is removed from the upper delivery end of the trough 20. With the parts so arranged the material is fed onto the usual conveyor apron to the cutter head 12, where it is cut and then passed through the gate 18 to the conveyer 18. The roughage is then conveyed to the left by the conveyer 18 where it is drawn upwardly by the revolving fan 32 and forced upwardly vertically through the discharge spout 36 into the separating hood 30. From the discharge spout 36 the material is directed against the curved portion 37 of the hood 30 where it comes in contact with the first deflector 39 and is directed against the first one of the three sets of separating vanes or blades 40 where the heavier particles such as corn and corn stalks and also cobs, where corn is being fed into the machine, strikes the slats or plates 42 on the front side of the vane passing in the inclined lower side of the hood 30. The lighter particles of material are passed in between the openings 43 which are formed between the slats and passed on up through the hood into the elbow 55, conduits 56 and 58 into the fan housing 22, while...
the heavier particles are deflected downwardly by reason of striking the slats on each of these separator vanes and are then dropped to the screw or conveyor 15 in the hopper 11, where they are conveyed into the grinding mechanism 16 for further reduction. From this grinding mechanism this ground material is fed through a conduit 27 and then mixed with the lighter material that is carried over the top of the hood into the fan casing.

Tests have shown that certain materials that have been fed through this improved separating mechanism, that upwards of seventy-five per cent (75%) of the material has been carried over the top of the separator, thereby, only necessitating the grinding of twenty-five per cent (25%) of the material that has heretofore been ground by machines of this character or type. Obviously this machine increases the capacity four hundred per cent (400%) under such conditions. The lever 53 permits all the separating vanes to be simultaneously adjusted so that the separating effects may be increased or diminished according to the different types of material passing therethrough.

In the above description I have described my improved separating mechanism in connection with a grinding mechanism. It will of course, be understood, that the separating feature may be used in connection with the cutting mechanism only for the purpose of making two distinct types of forage.

From the above description it will be seen that I have not only provided a novel and improved process for preparing forage for cattle, but also a novel and improved separating mechanism which has in effect, increases the capacity and efficiency of the roughage mill from three hundred to four hundred per cent over such types of mills that have heretofore made and used. It will also be noted that by my improved method of preparing forage for cattle, the lighter materials of the roughage are prevented from pulverization or dust form which has been proven heretofore to have a deleterious effect on cattle.

While in the above specification I have described my improved method of preparing forage for cattle and a preferred embodiment which the device may be made in practice, it will of course be understood, that the same is capable of modification, and that modification of the device may be made to secure my improved method without department from the spirit and scope of the invention as expressed in the following claims:

What I claim as my invention and desire to secure by Letters Patent is:

1. In combination with a roughage mill including a frame, a cutting mechanism mounted on said frame, a grinding mechanism mounted on said frame, an attachment operatively connected with said roughage mill, separating means carried by said attachment for separating certain of the materials cut by said cutting mechanism and passing the same through said grinding mechanism, and means for subsequently mixing all of said materials together.

2. In a machine of the class described comprising a frame, a main shaft mounted on said frame, a cutter head mounted on said shaft, a grinding mechanism mounted on said shaft, means for conveying the material from said cutting mechanism to said grinding mechanism, elevating means mounted on said shaft for elevating the material conveyed by said conveying mechanism and a separator located above said elevating mechanism for separating the lighter material from the heavier material and permitting the heavier material to pass through said grinding mechanism.

3. In a machine of the class described comprising a frame, a shaft mounted on said frame, a cutter head mounted on one end of said shaft, a grinding mechanism located at one end of said shaft, an elevating fan mounted on said shaft and between said grinding mechanism and said cutting mechanism, means for conveying the material from said cutting mechanism to said elevating fan, and a separator including a casing mounted over said elevating fan for separating the heavier materials from the lighter material and permitting the heavier material to pass through said grinding mechanism.

4. In a machine of the class described comprising a frame, a shaft mounted on said frame, a cutter head located at one end of said shaft, a grinding mechanism located at the other end of said shaft, a blower fan mounted on said shaft and located between said cutting mechanism and said grinding mechanism, means for conveying the material from said cutting mechanism to said blower fan and a separator including a hood located over said blower fan for separating the heavier material from the lighter material and permitting the heavier material to be conveyed into the grinding mechanism.

5. In a machine of the class described comprising a frame, a main shaft mounted on said frame, a cutter head mounted on one end of said shaft, a grinding mechanism located on the other end of said shaft, a blower fan mounted on said shaft and located between said cutter head and said grinding mechanism, means for conveying the material from said cutting mechanism to said blower fan, a separating hood located above said blower fan and mounted on said frame, and separating mechanism located in said separator hood for separating the heavier material from the lighter material and permitting the heavier material to pass into said grinding mechanism.

6. In a machine of the class described comprising a frame, a shaft mounted on said frame, a cutter head mounted on one end of said shaft, a grinding mechanism mounted on said frame, a fan mounted on said shaft between said cutting mechanism and said grinding mechanism, a separator including a hood mounted above said blower fan and a plurality of adjustable separator vanes mounted in said hood for separating the heavier material from the lighter material and permitting the heavier material to pass through said grinding mechanism.

7. In a machine of the class described, comprising a frame, a cutting mechanism mounted on said frame, a grinding mechanism mounted on said frame for grinding certain of the material cut by said cutting mechanism, a separating mechanism mounted on said frame above said grinding mechanism for separating the lighter material from the heavier material including a separating casing, means including a fan mounted on a shaft common to said cutting mechanism for conveying the material from said cutting mechanism to said separating mechanism, and a fan mounted on said frame for mixing the material passing through said machine and for creating a suction on one end of and air pressure on the other end of said separating mechanism.

8. In a machine of the class described, com-
prising a frame, a cutting mechanism mounted on said frame, a separating mechanism mounted on said frame, for separating the lighter material from the heavier material including a separating casing, means including a fan for conveying the material from said cutter head to said separator casing, a grinding mechanism mounted on said frame for reducing the heavier material, a shaft mounted on said frame forming a common drive for said cutting mechanism, fan and said grinding mechanism, a mixing fan for mixing the lighter material with the ground heavier material, and connections between said mixing fan and said casing for creating a suction on one end of said casing and an air pressure on the other end of said casing.

9. In a machine of the class described, comprising a frame, a cutting mechanism mounted on said frame, a grinding mechanism mounted on said frame, a shaft mounted on said frame for supporting and driving said cutting mechanism and said grinding mechanism, means including a fan mounted on said shaft for conveying the material from said cutting mechanism to said grinding mechanism, and means located between said cutting mechanism and said grinding mechanism for separating the heavier material from the lighter material, and passing the heavier material through said grinding mechanism, and means mounted on said frame and communicating with said last named means for mixing the ground material with the lighter material.

10. In a machine of the class described, comprising a frame, a main shaft mounted on said frame, a cutter head mounted on said shaft, a grinding mechanism mounted on said shaft for grinding the material cut by said cutting mechanism, means for conveying the material from said cutting mechanism to said grinding mechanism, elevating means mounted on said shaft for elevating the material conveyed by said conveying mechanism, and a separator located above said shaft and communicating with said grinding mechanism and with said elevating means for separating the lighter material from the heavier material and permitting the heavier material to pass through said grinding mechanism.

11. In a machine of the class described, comprising a frame, a main shaft mounted on said frame, a cutter head mounted on said shaft, a grinding mechanism mounted on said shaft for grinding the material cut by said cutting mechanism, means for conveying the material from said cutting mechanism to said grinding mechanism, elevating means mounted on said shaft for elevating the material conveyed by said conveying mechanism, a separator located above said shaft and communicating with said grinding mechanism and with said elevating means for separating the lighter material from the heavier material and permitting the heavier material to pass through said grinding mechanism, and means mounted on said frame for subsequently mixing all of said materials together.

12. In a machine of the class described comprising a frame, a cutting mechanism mounted on said frame for cutting material passing therethrough into roughage, a separator mounted on said frame for extracting leaves and lighter materials from said roughage, a conveying mechanism mounted on said frame for conveying the roughage from said cutting mechanism to said separator, a grinding mechanism mounted on said frame for grinding the remaining portion of said roughage, a conduit connected with said separator for directing said extracted roughage around said grinding mechanism so as to prevent said extracted roughage from being reduced to a state of fineness uniform with the ground material, and means for mixing these materials of different fineness.

13. In a machine of the class described comprising a frame, a main shaft mounted on said frame, a cutting mechanism mounted on said shaft for cutting material passing therethrough into roughage, a separator mounted on said frame for extracting the leaves and lighter portions from said roughage, a grinder mounted on said shaft for grinding the remainder of said roughage, a mixing mechanism mounted on said frame, a conveying means connecting said separator with said mixing mechanism for conveying said extracted roughage unground to said mixing mechanism, and separate means for conveying the ground material to said mixing mechanism.

14. In a machine of the class described comprising a frame, a main shaft mounted on said frame, means mounted on said shaft for cutting the material passing therethrough into roughage, air separating means for extracting leaves and lighter portions of said roughage, means mounted on said shaft for reducing the remaining portion of said roughage, means for by-passing said roughage around said reducing means, and means for mixing the reduced material with said extracted material.

15. In a machine of the class described comprising a frame, a main shaft mounted on said frame, means mounted on said shaft for cutting material passing therethrough into roughage, means for extracting the leaves and lighter material from said roughage, grinding means mounted on said shaft for reducing the remaining portion of said roughage, means for by-passing said roughage around said grinding means for preventing the reduction of the extracted roughage, and means for mixing said reduced material with said extracted material.

16. In a machine of the class described comprising a frame, a main shaft mounted on said frame, means mounted on said shaft for cutting the material passing therethrough into roughage, means for extracting certain of said roughage having certain characteristics, grinding means mounted on said shaft for reducing the remaining portion of said roughage having different characteristics, means for by-passing the extracted roughage around said grinding means, and means for mixing said reduced material with said extracted material.

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