

Aug. 18, 1936.

J. HOLLAND-LETZ

2,051,489

SEPARATOR DEVICE FOR ROUGHAGE MILLS

Filed May 18, 1931

3 Sheets-Sheet 2

FIG. 2.

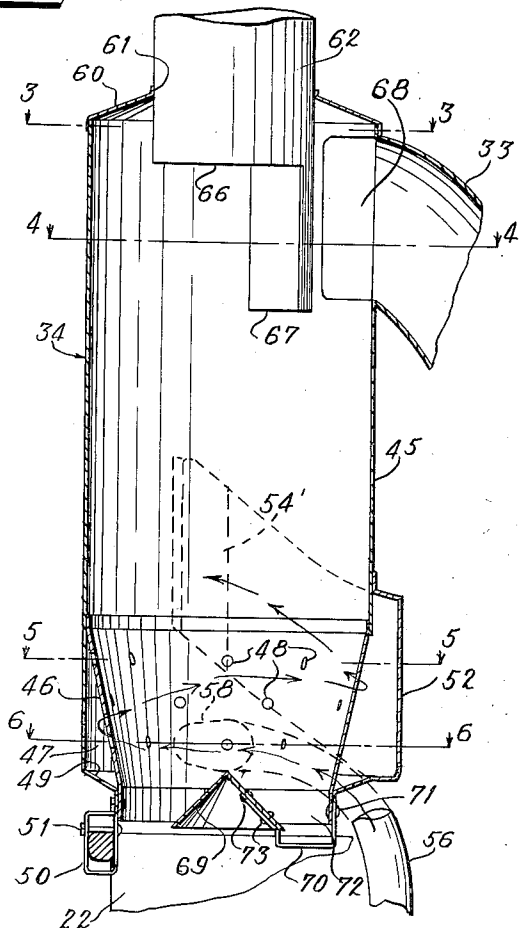


FIG. 3.

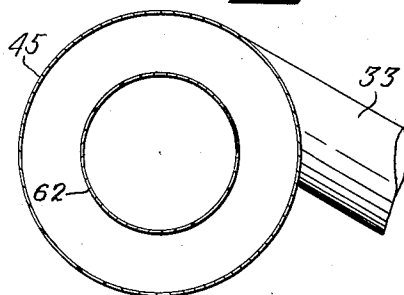


FIG. 4.

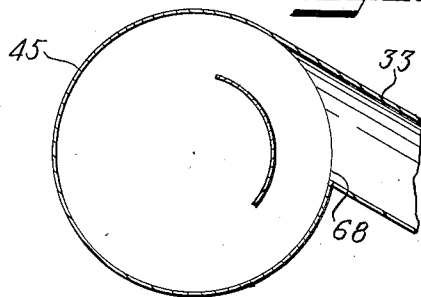


FIG. 5.

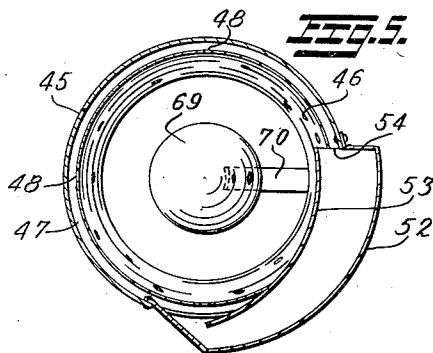
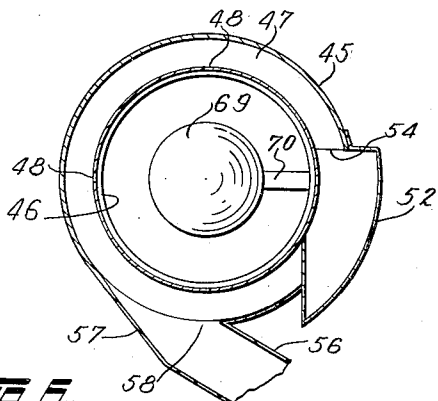


FIG. 6.



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FIG. 7.

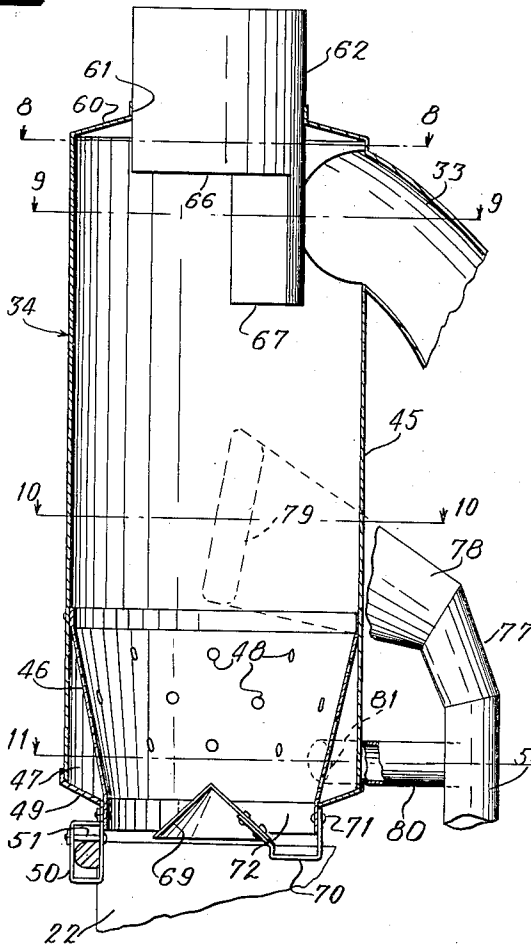


FIG. 8.

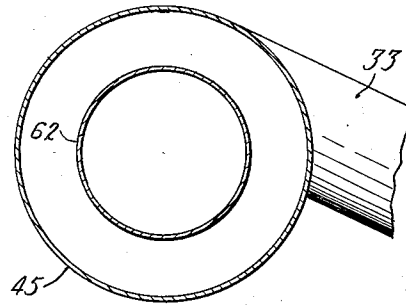


FIG. 9.

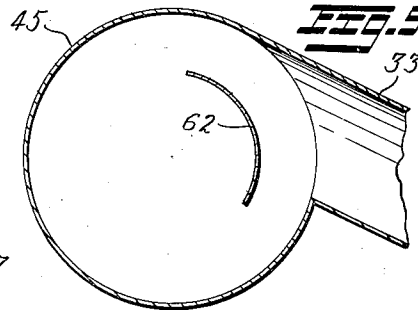
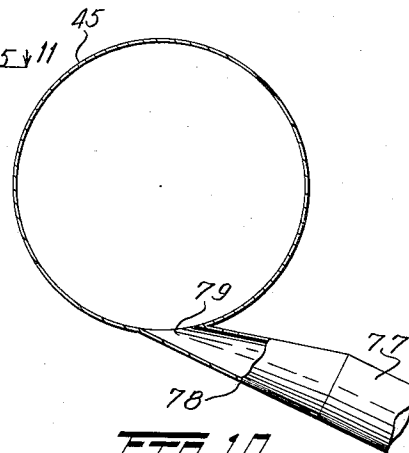


FIG. 10.

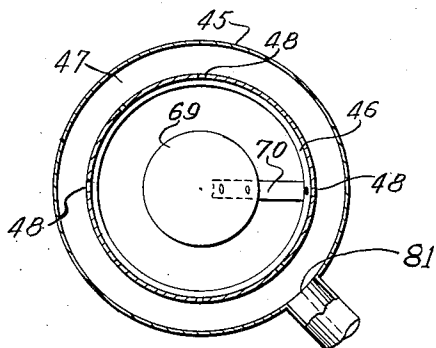


FIG. 11.

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2,051,489

SEPARATOR DEVICE FOR ROUGHAGE MILLS

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Application May 18, 1931, Serial No. 538,044

12 Claims. (Cl. 83—8)

The present invention relates generally to roughage mill and more particularly to a separating device for roughage mill for increasing the capacity and efficiency of the 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 roughage mill for separating certain of the materials from certain other of the materials passing through the mill, such for example, as separating the heavier material from the lighter material and permitting only the heavier material to pass through the grinding mechanism for further reduction.

A further object of the invention is to provide a novel and improved separating device for roughage mill, which will separate grain, corn, corn cobs or other heavy materials from the lighter materials as the same is passing through the roughage mill and thereby reduce the amount of material which is required to pass through the grinding mechanism.

Another object of the invention is to provide an improved separator device for roughage mill in which a single fan mechanism is made use of, to furnish a suction as well as a draft therefor to more efficiently separate the heavier material from the lighter material prior to passing the heavier material through the grinding mechanism for further reduction.

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 a front elevational view partly in cross-section of one form of my attachment for roughage mill;

Fig. 2 is a vertical enlarged detailed cross-sectional view of the cylindrical separator; the dash lines in this figure show diagrammatically how these parts are connected to the removed half of the separator cylinder;

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 of Fig. 2;

Fig. 5 is a cross sectional view taken on the line 5—5 in Fig. 2;

Fig. 6 is a cross sectional view taken on the line 6—6 in Fig. 2;

Fig. 7 is an enlarged detailed cross sectional view of a modified form of separator; the dash

lines in this figure show diagrammatically how these parts are connected to the removed half of the separator cylinder;

Fig. 8 is a cross sectional view taken on the line 8—8 in Fig. 7;

Fig. 9 is a cross sectional view taken on the line 9—9 in Fig. 7;

Fig. 10 is a cross sectional view taken on the line 10—10 in Fig. 7;

Fig. 11 is a cross sectional view taken on the line 11—11 in Fig. 7;

Fig. 12 is a cross sectional view taken on the line 12—12 in Fig. 1; and

Fig. 13 is a detailed view of the fan mechanism shown in Fig. 1.

The present invention is an improvement over my co-pending application, Serial No. 180,085, filed April 1, 1927 now matured into Patent No. 1,368,983 and Serial No. 451,101, filed May 9, 1930.

It is well known that the grinding of the forage results in the pulverization of certain of the lighter ingredients, and their conversion into an injurious dust. Heretofore it has been the practice to include in machines of this class an elaborate means for separating or extracting this injurious dust from the rest of the forage. In the present method and machine the formation of this injurious dust has not only been prevented but the material which formerly pulverized into this dust is now included in the forage as a beneficial element.

For the purpose of illustration, I have shown my improved separator device in connection with a form of roughage mill disclosed in the above entitled co-pending applications. The roughage mill in this instance comprises the usual supporting structure indicated by the reference character 15 which in turn is provided with the usual main shaft 16, cutter head 17, cutter head casing 18, a circular grate 19, extending from and surrounding the cutter head. Located at one side of the cutter head 17 and secured to the main drive shaft 16 is a conveyor screw 20. Positioned adjacent the conveyor screw is a grinding mechanism, generally indicated by the reference character 21. Positioned over the conveyor screw 20 is a hopper 22. Positioned below the grate 19 is another conveyor screw 23 which is operatively driven through a train of gears 24. The conveyor screw is mounted in a suitable trough 25 which in turn communicates with a conduit 26 for conveying the materials from the cutter head to a fan casing generally indicated by the reference character 27. Positioned between the con-

duit 26 and conveyor trough 25 is a removable plate or gate 28 for controlling the communication therebetween. When the gate 28 is in place, the conveyor screw 23 conveys the material to an elevating fan hereinafter described. Located between the cutter head 17 and the conveyor screw 20 and surrounding the main drive shaft 16 is an enclosed fan casing 29 in which is mounted a fan 30, which in turn is secured to the shaft 16 and operatively driven thereby. Located in the lower portion of the fan casing 29 is an opening 31 in which a removable plate may be inserted for controlling the communication between the fan casing 29 and the trough 25. Extending upwardly from and in a position tangent to the periphery of the fan 30 is a material conveying conduit 32 which is connected by an angularly disposed elbow connection 33 to an opening in the side of my improved cylindrical separator generally indicated by the reference character 34, the details of construction of which will be more fully hereinafter described. Mounted within the fan casing 27 is a mixing and elevating fan 35 which in turn is secured to one end of a shaft 36 journaled in suitable bearings 37 and 38 secured to the fan casing and main frame respectively. The outer end of the shaft 36 is provided with a pulley wheel 39 which in turn is geared to a drive pulley 40 by means of a belt in the manner well understood in the art. Positioned adjacent the pulley 40 is a large pulley 41 which is secured to the main shaft 16 and may be connected up with the source of power for driving the mill.

Connected to the lower portion of the grinding mechanism housing 21 is a conduit 42 which is connected to and communicates with a larger conduit 43 which conveys the material from my improved separator device to the mixing fan casing 27. Extending vertically upwardly and arranged tangentially to the periphery of the revolving fan 35 is a discharge conduit or spout 44, the upper end of which may be connected to any suitable receptacle for receiving the mixed comminuted material.

The mechanism above described is substantially identical with the mechanism described in the above referred to co-pending application, Serial No. 451,101 and for that reason it is believed that a more detailed description of the same is unnecessary.

The important features of the present invention consists in a new method of preparing forage and a novel device which includes a separating mechanism for a roughage mill which is especially adapted for separating the kaffir-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, as a matter of fact, is the only material requiring a further reduction) may be passed through the grinding mechanism. Tests have shown that the heavier materials constitute about one-fourth of all of the materials passing through the cutter head and by so separating the lighter material from the heavier material, only about one-quarter of the material passing through the cutter head is required to pass through the grinding mechanism, thereby increasing the capacity of the machine from three to four hundred per cent. In other words, heretofore, where the roughage mill was only capable of handling one ton of material as a maximum capacity, it is now capable of handling four tons of material in the same length of time. Obviously this improved construction, not only increases the capacity and

efficiency of the roughage mill, but also reduces to a minimum, the wear on the grinding plate of the grinding mill so that frequent replacement of the same is not required.

The separating mechanism hereinafter described, is capable of handling large volumes of material and separating the heavier from the lighter without the possibility of choking. This improved separating device comprises a cylindrical casing as indicated at 45. Mounted internally of the cylindrical casing 45 and located at the lower end thereof is an inverted cone-shaped wall 46, which in turn forms in effect an air compartment or air circulating chamber 47. This cone-shaped wall 46 is provided with a plurality of spaced apart apertures 48 for the purpose hereinafter set forth. The lower end of this chamber 47 is enclosed by an inclined bottom 49 which is secured to the lower end of the cylindrical casing 45 and to the lower end of the cone-shaped wall 46. The cylindrical separator 45 is securely fastened to the upper end of the hopper 22 by means of suitable brackets 50 and bolts 51. Communicating with the circular air chamber 47 at one side thereof, is a rectangular spirally arranged conduit generally indicated by the reference character 52. This spirally arranged conduit 52 is provided with an internal wall 53, which extends into an opening 54 formed in the lower end of the wall of the cylindrical casing 45 at one side of the air chamber 47. The upper end of the conduit 52 is connected to an opening or aperture 54' which is located in the cylindrical wall of the casing 45 above the inclined, inverted cone-shaped wall 46 for discharging the air tangentially in the cylindrical separator at a point above the cone-shaped wall. It will be noted that the current of air is discharged spirally in a direction opposite to the incoming material at the top of the cylinder. Connected to the rear side of the delivery spout 44 and communicating therewith is a relatively reduced air conduit 55 which in turn is provided with curved elbow as shown at 56. The upper end of this conduit is connected tangentially as shown at 57 to an opening 58 in the cylindrical portion of the separating casing 45 so that the air may be discharged tangentially to the air chamber 47 formed between the inclined or conically shaped wall 46 and the cylindrical casing 45. The air conduit 55 is provided with a damper or valve 59 of any well known construction for regulating the amount of air passing from the conduit 55 into the air chamber 46. The purpose of this valve is to regulate or control the amount of air being supplied to the separator casing so as to form an efficient means for efficiently separating the heavier material from the lighter material in accordance with the type of material being fed into the roughage mill. For example, a greater amount of air is required to pass through the conduit 55 to the air chamber 46 when the heavier materials such as corn are being fed into the roughage mill than is required to separate the heavier materials from oats and the like materials.

The upper end of the cylindrical separator or casing 45 is provided with a beveled or conically shaped tapered top 60 which in turn is provided with an axial or center opening 61 in which is securely mounted a suction conduit 62. The suction conduit 62 is provided with a semi-circular or double elbow 63 which in turn is connected to a vertically disposed conduit 64. The lower end of the conduit 64 is connected to the conduit 43 by means of an elbow 65. As previously de-

scribed, the conduit 43 is connected to one side of the fan casing 27 at the axial center of the fan 35 so that upon a rotation of the fan 35 a suction is created within this conduit which leads to the axial center of the upper end of the separator casing 45. The lower end of the conduit 62 extends downwardly below the upper portion of the cylindrical casing 45 as shown at 66 and has a portion thereof as shown at 67 extending downwardly below the opening 68 in the upper end of the cylindrical casing 45 to which the discharge spout 33 is connected. This baffle wall 67 is curved as clearly shown in Fig. 4 and causes the material as it is discharged from the conduit 33 through the opening 68 to travel in a spiral or circular path when the same is discharged into the separator cylinder.

In order to prevent the suction from creating a column of air passing up through the axial center of the cylindrical separator 45 and to more efficiently separate the lighter materials from the heavier materials, I have provided cone-shaped baffle 69 located at the lower end or mouth of the cylindrical separator. This baffle 69 is supported in position by a bracket 70 which has one end thereof secured by means of a rivet 71 to a vertically extending flange portion 72 formed on the lower end of the inverted conically shaped walls 46. The other end of the bracket 70 is secured by means of rivets 73 to the underside of the cone-shaped baffle 69. Obviously from the above construction, the air is drawn around the periphery of the baffle 69 and between the flange 72 of the conically shaped wall 46 so that as the heavier materials are falling, the lighter materials will be circulated and drawn upwardly by the suction created by the fan 35 and these materials will be drawn through the conduit 62, 63, 64 into the mixing fan casing 27.

Extending over the delivery end of the endless conveyor (not shown) and covering a substantial portion of the cutter head is a hood 74 which is connected by means of a conduit 75 to an opening 76 (common to the conduit 26) on one side of the fan casing 27. This conduit 75 and hood 74 conducts the dust and pulverized material resulting from the cutting of the material adjacent the cutter head and draws the same into the mixing fan casing by reason of the suction created therein by the fan 35.

In order to further assist the fan 35 in elevating the cut material to the upper end of the separator cylinder, I have provided an air conduit 73' which has one end thereof as shown at 74', communicating with the conduit 55 below the damper 59, and the other end thereof communicating with the conduit 32 as shown at 75'. This arrangement permits the fan 35 to assist in elevating the cut material in the conduit 32.

The operation of my improved separating device for roughage mill is as follows:

Let us assume that the gate or plate 28 is positioned in place so as to cut off communication between the trough 25 and the conduit 26 leading to the fan casing 35 and that the opening 31 leading from the trough 25 to the fan casing 29 as indicated by 31 is opened by removal of the plate therefor, the material is placed on the conveyor (not shown) and fed into the cutter head 17 where it is cut and passed through the grate 19 into the trough 25. The material in the trough is then conveyed to the left as shown in Fig. 1 of the drawings, where it is elevated by the fan 30 and discharged through the conduit 32 into the opening 68 in the upper end of the cylindrical

separating casing 45. It will be noted that the conduit 33 discharges the cut material substantially tangential to the cylindrical casing and by reason of the circular baffle wall 67 which is spaced from the opening 68 in the casing 45, the material is caused to be swirled in a circular motion within the cylindrical casing 45. This swirling motion of the material as it is discharged into the casing causes the heavier part to adhere closely to the inner wall of the casing while the lighter particles will be forced inwardly toward the axial center of the casing. As this is occurring within the cylindrical casing, it will, of course, be understood that the fan 35 is creating a suction through the conduit 43, 64, 63 and 62 to draw the lighter material up through the lower end 66 of the conduit 62 as the heavier materials fall downwardly in the separator cylinder 45. To further facilitate the efficient separation of the heavier material from the lighter material, the conduit 55 receives a supply of air pressure from the discharge spout 44 which pressure is discharged through an opening 58 into the air chamber 47 formed between the conically shaped wall 46 and the lower end of the cylindrical casing 45. Substantially one half this air pressure is discharged through openings 48 in the conical wall 46 to assist in further removing the lighter material from the heavier material during its fall from the upper end of the cylindrical casing down into the hopper 22. The area of the holes 48 about the conically shaped wall 46 is approximately one-half the area of the conduit 55 so that the remaining half of the air pressure passing through this conduit is discharged into the tangentially discharging spiral conduit 52 which communicates with the air chamber 47 and is discharged into the opening 54' through the inner surface of the cylindrical casing 45, thereby discharging the current of air in a direction opposite to the circular discharge of the material coming through the spout 33. This action adds to the efficiency of separating the lighter material from the heavier material and precludes the possibility of choking. In this connection it will, of course, be understood if corn on the stalk is being fed into the cutter head, the heavier material, such as kernels of corn, corn cobs, the heavier portions of the corn stalk, will be separated from the lighter material and will be dropped downwardly into the hopper 22 as the lighter material is drawn upwardly by the suction through the conduit 62 into the fan casing 27. The efficiency of the separating cylinder is further facilitated by the cone-shaped baffles 69 by distributing the up-going currents of air between the outer periphery of the baffle 69 and the vertical flange 72 of the cone-shaped wall 46. The heavier material is then conveyed by the screw 20 to the grinding mechanism 21 where the same is comminuted and passed through the conduit 42 into the conduit 43, where the same is conveyed with the other or lighter material into the fan casing 27, where the same is then thoroughly mixed and discharged through the spout or conduit 44 into any suitable receptacle.

In Figs. 7 to 11 inclusive, I have shown a modified form of my cylindrical separator in which the general features thereof are essentially like those of the cylindrical separator of my preferred form shown in Figs. 1 to 6 inclusive, except that the conduit 55 is connected by an elbow 77 to an enlarged discharge spout 78 into an opening 79 located above the inclined or conical shaped wall 46. This spout 78 discharges its current of air

substantially tangentially to the inner surface of the separator cylinder 45 as clearly indicated by Fig. 10 of the drawings. In this modified form, a branch of the conduit 55 is connected by a reduced conduit 80 which is arranged at right angles to the conduit 55 and communicated with the air chamber 47 to an opening 81 in the cylindrical casing 45 adjacent the lower end thereof as clearly shown in Figs. 7 and 11.

10 The operation of this modified cylindrical separator is essentially like the preferred form shown in Figs. 1 to 6 except that the current of air or air pressure passing through the conduit 55 is distributed so that a portion of the same is discharged through the branch conduit 80 into the cylindrical chamber 47 from where it is passed through apertures 48 in the cone-shaped wall 46 to assist in separating the lighter materials from the heavier materials as they are falling. The remaining portion of the air pressure passing through the conduit 55 is discharged through the opening 79 in the wall of the cylindrical separator 45 tangentially to the inner surface thereof and in a direction opposite to that of the incoming material which is discharged through the spout or conduit 33 into the upper end of the cylindrical casing 45.

From the above description it will be readily seen that I have not only provided a simple, novel and improved separating device for roughage mill, but also an improved method for preparing forage for cattle which will increase the capacity of the roughage mill from three to four hundred per cent and at the same time will prevent the pulverizing of certain portions of the material into dust which is well known to have a deleterious effect on cattle. It will also be noted that the suction fan which is incidentally used for mixing and elevating the mixed forage, is also utilized for performing the function of an air pressure fan for aiding the efficient separation of the lighter material from the heavier material and is also used for assisting in elevating the cut material in its travel from the cutter head to the separating cylinder.

While in the above description I have described my improved method of preparing forage for cattle and a preferred form of a device, which my invention may assume in practice, it will of course, be understood that other modifications may be made to secure my improved method without departing from the spirit and scope of the invention as expressed in the following claims:

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

1. 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 separating mechanism mounted on said frame and positioned above said grinding mechanism for separating the lighter material from the heavier material, means for conveying the material from said cutter head to said separating mechanism, means mounted on said frame for mixing the material passing through said machine and for creating a suction on one side of and an air pressure on the other side of said separating mechanism and means for utilizing a portion of the air pressure created by said last named means for assisting in conveying the material from said cutting mechanism to said separating mechanism.

2. In a machine of the class described, comprising 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 separator casing, a grinding mechanism mounted on said frame for grinding the heavier material, a fan mounted on said frame for mixing the ground material with the lighter material, and a conduit connecting said fan with said casing for creating a suction on one end of said casing and an air pressure on the other end of said casing, said fan having a conduit connected adjacent said cutting mechanism for assisting in conveying the material from said cutting mechanism to said separating mechanism.

3. In a machine of the class described, comprising a frame, a cutter head mounted on said frame, a grinding mechanism mounted on said frame, a separating mechanism mounted on said frame including a cylindrical casing, means including a fan mounted on a shaft common to said cutter head and said grinding mechanism for conveying the material from said cutter head and discharging the same into the upper end of said casing tangentially to the inner surface thereof, and a mixing mechanism for mixing the ground material with the lighter material, said mixing mechanism adapted to create a suction at one end of said casing and adapted to create an air pressure at the other end of said casing for effecting the complete separation of the lighter material from the heavier material.

4. In a machine of the class described, comprising a frame, a main drive shaft mounted on said frame, a grinding mechanism mounted on said shaft, a cutter head mounted on said shaft, means for conveying the material from said cutting mechanism to said grinding mechanism, an elevating fan mounted on said shaft, a grinding mechanism mounted on said shaft for grinding the material cut by said cutting mechanism, a cylindrical separator mounted above said grinding mechanism, an elevating conduit for conveying the material from said cutting mechanism to said separator, a suction and mixing fan mounted on said frame and having a conduit connecting the same with the upper end of said separator, a casing for said mixing fan, a discharge spout connected with said fan casing, a supplemental conduit connecting the discharge spout with the lower end of said separator casing for setting up the spiral current of air therein, and a conduit connecting said last named conduit with said elevating conduit for assisting in conveying and elevating of the cut material from said cutting mechanism to the upper end of said separator cylinder.

5. 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 the material cut by said cutting mechanism, an elevating fan mounted on said frame and driven by a shaft common to said cutting and grinding mechanism, a separating mechanism including a cylindrical casing mounted on said frame, a conduit connecting said elevating fan with the upper end of said separating casing for discharging the material tangentially therein, a suction fan connected with one end of said casing, a discharge conduit connected to said suction fan for discharging the material therefrom, a conically shaped wall located at the lower end of said casing forming a circular air chamber therein, and means forming communications between said discharge conduit, and said air chamber

for assisting the separation of the lighter material from the heavier material passing through said separating casing.

6. In a machine of the class described, comprising a frame, a cutter head mounted on said frame, a grinding mechanism mounted on said frame for grinding the material cut by said cutting mechanism, a separating mechanism located above said grinding mechanism, including a cylindrical separating casing, means for conveying the material from said cutter head and discharging it tangentially into the upper end of said casing, a single fan communicating directly with said casing and with said grinding mechanism for removing the lighter material from said separating mechanism and subsequently mixing the ground material with the lighter material, a conduit connecting said fan with said casing for creating a suction on the upper end of said casing, and a connection between said fan and said casing for setting up a spiral current of air in the other end of said casing.

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 the material cut by said cutting mechanism, a separating mechanism mounted on said frame, means for conveying material from said cutting mechanism to said separating mechanism, said separating mechanism comprising a cylindrical separating casing for separating the heavier material from the lighter material, a mixing fan mounted on said frame and adapted to withdraw the lighter material therein from said separator and mix the same with the ground material from said grinding mechanism, a discharge conduit connected with said mixing fan, a branch conduit for setting up a spiral current of air within said casing to aid in separating the lighter material from the heavier material passing therethrough, and a supplemental conduit connecting said branch conduit with said conveying mechanism for assisting in conveying the material from the cutting mechanism to said separating mechanism.

8. In a machine for preparing a non-uniform forage for cattle comprising a frame, cutting mechanism mounted on said frame for cutting the material into roughage form, a grinding mechanism mounted on said frame for reducing certain of the material cut by said cutting mechanism, means for conveying all of the material from said cutting mechanism in a direction towards the grinding mechanism, a separating attachment interposed in the path of travel of said material from said cutting mechanism to said grinding mechanism for permitting only heavier material to pass through said grinding mechanism, a fan mechanism mounted on said frame for mixing the separated material with the ground material, conduits connecting said last named fan inlet and outlet with the opposite ends respectively of said separating attachment, and a conduit connecting said grinding mechanism with said last named fan.

9. In a machine for preparing non-uniform forage for cattle comprising a frame, a cutting mechanism mounted on said frame for cutting the material into roughage form, a grinding mechanism mounted on said frame for reducing

certain of the material cut by said cutting mechanism, means for conveying all of the material from said cutting mechanism in a direction towards said grinding mechanism, separating means interposed in the path of travel of said material from said cutting mechanism to said grinding mechanism for permitting the heavier material only to pass through said grinding mechanism, a fan mechanism mounted on said frame for mixing the separated material with the ground material, conduits connecting said last named fan inlet and outlet with the opposite ends respectively of said separating means, and a conduit connecting said grinding mechanism with said last named fan.

10. 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 cutter head to said separating mechanism, a fan mounted on said frame for mixing the material passing through said machine, conduits connecting said last named fan inlet and outlet with the top and bottom respectively of said separating mechanism for creating a suction on one side and an air pressure on the other side of said separating mechanism, and a conduit connecting said grinding mechanism with said last named fan.

11. In combination with a roughage mill including a frame, a cutting mechanism mounted on one end of said frame, a grinding mechanism mounted on the other end of said frame, means for conveying the material cut by said cutting mechanism to said grinding mechanism, a hopper positioned adjacent said grinding mechanism, a separating attachment mounted on said hopper for separating the heavier material from the lighter material and passing the former through said grinding mechanism, a mixing fan mounted on said frame for mixing the material passing through said mill, conduits connecting said mixing fan inlet and outlet with the top and bottom respectively of said separating attachment, and a conduit connecting said grinding mechanism with said last named fan.

12. In combination with a roughage mill including a frame, a cutting mechanism mounted on said frame, a grinding mechanism mounted on said frame, a conveyor screw located below said cutting mechanism for conveying the material from said cutting mechanism to said grinding mechanism, a separating attachment located between said cutting mechanism and said grinding mechanism for withdrawing material of certain specific gravity from material of different specific gravity, a mixing fan mounted on said frame, conduits connecting said last named fan inlet and outlet with the top and bottom respectively of said separating attachment, and a conduit connecting said grinding mechanism with said last named fan.

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