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CONVEYING AND ELEVATING MECHANISM FOR ROUGHAGE MILLS

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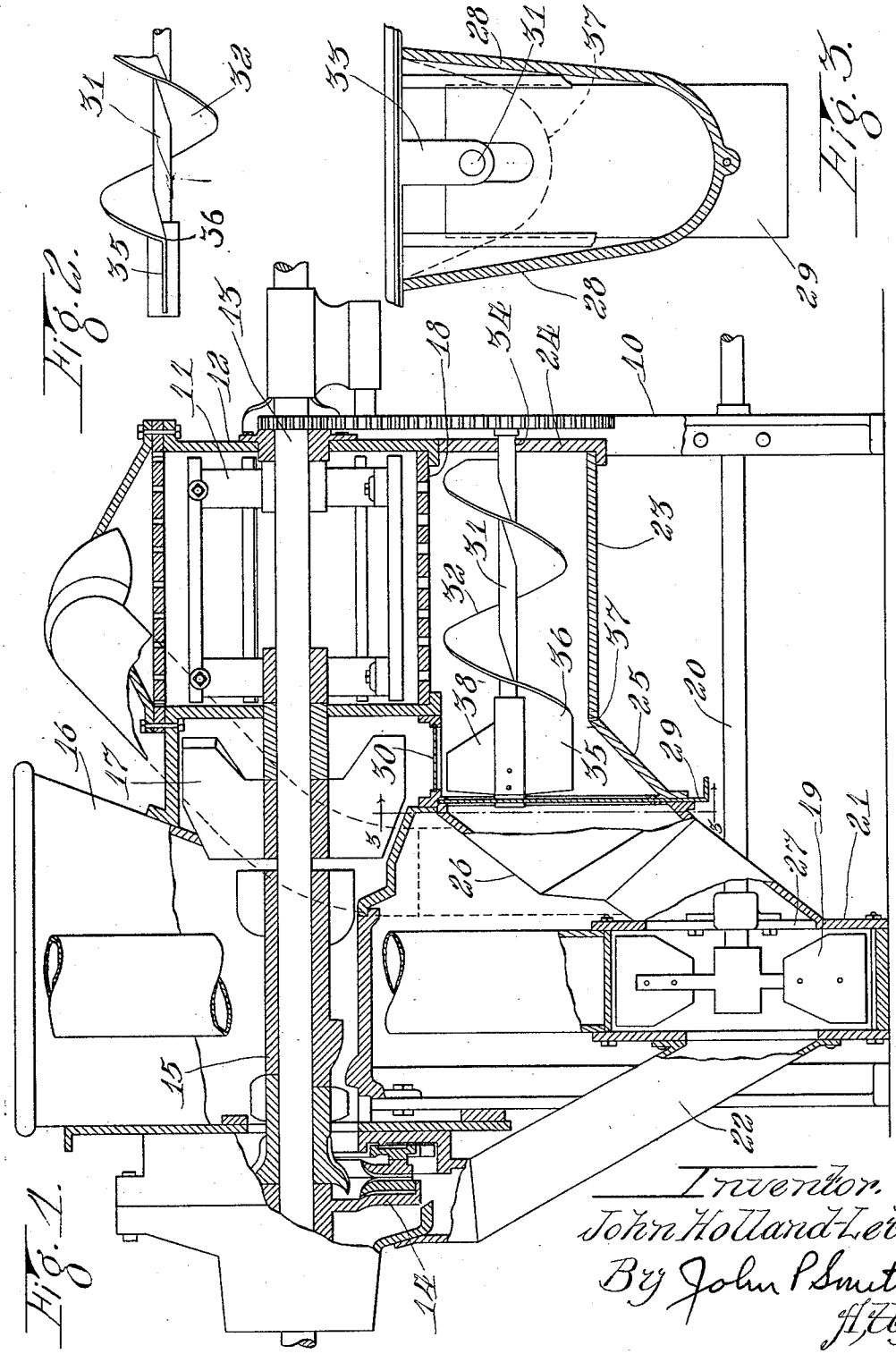

Fig. 1.

Fig. 2.

Fig. 3.

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UNITED STATES PATENT OFFICE

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CONVEYING AND ELEVATING MECHANISM FOR ROUGHAGE MILLS

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One of the objects of the present invention is to provide an improved and simplified construction of a conveying and elevating mechanism for roughage mill which will prevent the possibility of the conveying and elevating mechanism of the mill from choking.

A still further object of the invention is to provide a novel and improved construction of a screw conveyor and casing therefor by means of which the material passing or being conveyed by the screw through the casing will either be effectively elevated in the roughage mill or discharged from the casing of the screw at one end thereof downwardly without any possibility of it choking when the mill is in operation.

These and other objects are accomplished by providing a construction and 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 of a roughage mill with parts thereof shown in cross section, which shows my improved conveying and elevating mechanism embodied therein.

Fig. 2 is a top plan view of the construction of the conveyor screw, and

Fig. 3 is a fragmentary end elevational view taken on the lines 3—3 of Fig. 1, showing the removable plate and the inner bearing support for the conveyor screw shaft.

The present invention is directed to improving the operation and increasing the capacity of a roughage mill which is primarily used for the purpose of making or preparing different types of forage, and has particular reference to the improved means for conveying or elevating the material from one portion of the mill to another portion of the mill, and to eliminate any possibility of choking of the mill.

The present invention is directed to an improvement over the form of roughage mill described and claimed in my co-pending application, Serial No. 180,085, filed April 1st, 1927, on a cutting and grinding apparatus.

For the purpose of illustration I have shown my invention embodied in a roughage mill of the type illustrated and described in the above referred to co-pending application and comprises a suitable frame structure generally indicated by the reference character 10. a cutter head 11 mounted in a casing 12. The cutter head 11 is secured to a main shaft 13. Secured to and operatively connected to the other end of the shaft 13 is a grinding mechanism generally indicated by the reference character 14. Mounted between the grinding mechanism 14 and the cutter head 11, and secured to the shaft 13 is a conveying and crushing screw 15. Positioned over the conveying and crushing screw 15 secured to the frame structure in any well known manner is a hopper 16 in which material may be inserted to be ground by the grinding mechanism 14. Positioned between the inner wall of the cutter head casing 12 and the conveying and crushing screw 15 and secured to the shaft 13 is an elevating screw 17. Positioned around the cutter head 11 in the manner described in the aforesaid co-pending application is a perforated arcuate plate 18 through which the material from the cutter head passes into my improved conveying and elevating mechanism hereinafter described. Mounted below both the grinding mechanism and the cutter head is a mixing mechanism which comprises a revolving fan generally indicated by the reference character 19, which is mounted on a shaft 20 in a fan casing or mixing receptacle 21. The axial center of the fan casing 21 is connected by a conduit 22 to the casing of the grinding mechanism 14 for conveying and drawing the material from the grinding mechanism to the fan casing or mixing receptacle 21. A more detailed description of the mechanism thus far described is believed unnecessary for complete understanding of my present invention, because further information concerning the detail of this construction may be had by referring to my co-pending application hereinbefore mention.

The primary feature of the present invention is directed to a novel construction of a conveyor screw and its co-operating casing for conveying the material cut by the cutter head to the grinding mechanism for further reduc-

ing the material cut by the cutter head, by passing the same through the grinding mechanism, or for conveying the material cut by the cutter head directly to the mixing mechanism in which it may be directly mixed with separate material ground by the grinding mechanism for preparing different types of forage.

This novel mechanism comprises a curved casing or trough 23 which in turn is mounted in a side plate or frame member 24 secured to the frame 10 in any well known manner. The inner end of the casing or trough 23 has a downwardly extending chute 25 which extends substantially at an angle of 45 degrees to the normal horizontal bottom of the trough 23 at a point adjacent the inner end of the conveyor screw hereinafter described. The inner end of this chute 25 and trough 23 are connected by a suitable conduit 26 to an axial aperture indicated at 27 formed in the mixing or fan casing 21. Mounted in suitable grooves or guides 28 and located on the opposite sides of the trough 23 is a removable plate 29, which may open or close communication between the trough 23 and the conduit 26 leading to the mixing or fan casing 21. Located between the housing embracing the elevating screw 17 and the inner end of the screw casing 23 is a second removable plate 30 which may be inserted or removed, for controlling the communication therebetween. In the manner described in my above referred to co-pending application it will, of course, be understood, that when the adjustable plate 30 is removed and the plate or valve 29 is inserted, the material cut from the cutter head will be elevated through this opening to the elevating screw 17 and will be conveyed therefrom by means of the conveying and crushing screw 15 to the grinding mechanism, for further reducing the material cut by the cutter head, and, in the manner described in the said co-pending application, if the plate 30 is inserted for closing the opening between the elevating screw compartment and the conveying trough 23, and the plate 29 is removed, the material cut by the cutter head will then be conveyed through the conduit 26 into the mixing or fan casing 21 and there be mixed with other or separate material ground by the grinding mechanism.

Rotatably mounted in the conveying trough 23 on a shaft 31 is my improved form of conveyor screw generally indicated by the reference character 32. The shaft 31 is mounted at its inner end by a suitable bearing 33 while the outer end thereof is journaled in an aperture 34 formed in the outside plate 24 of the casing. The major portion of this conveyor screw is of the conventional spiral type but has its inner end as shown at 35 terminating in a flat radially and longitudinally extending blade as clearly shown in Fig. 2 of the drawings. The flat portion of this blade begins as shown at 36 at a point substantially in transverse alignment with the beginning of the inclined portion as shown at 37 and the inclined portion 25 of the trough 23, and terminates at a point shortly inside the removable plate or valve 29. Located on the side opposite the flat radial portion 35 of the conveyor screw 32 and in a plane therewith is an agitating tooth or plate 38. This plate extends longitudinally of the conveyor shaft 31. This tooth or plate 38 together with the flat radial portion 35 of the conveyor screw 32 assists the screw in elevating and agitating the material in the conveying trough 23 so that the same may efficiently elevate the material to the elevating screw 17 when the plate 30 is removed and the second plate 29 inserted so that the possibility of clogging the trough at this end of the conveyor trough is entirely eliminated and provides an efficient means for elevating the the material from a position below the cutter head upwardly, so that it may be ground by the grinding mechanism. On the other hand when it is desired to adjust the machine so that the material cut by the cutter head is to be mixed directly with separate material ground by the grinding mechanism, the plate 30 is inserted and the plate 29 removed. The radial flat portions 35 and 38 of the conveyor screw will effectively force the material down the inclined portion 25 of the trough 23 and prevent any possibility of clogging of the material in this end of the trough when the roughage mill is operated in this manner.

From the above description it will be seen that I have provided a novel and improved construction of a conveyor screw in combination with a novel and co-operating trough, so that the material conveyed thereby may be efficiently elevated for further reduction through the grinding mechanism, or may be efficiently discharged therefrom into the mixing mechanism directly, without the possibility of the materials clogging, as is occasioned in some instances with the conventional form of spiral blade, where it extends throughout the entire length of the trough. This arrangement not only eliminates the possibility of clogging at this end of the conveying mechanism, but increases the efficiency and capacity of the entire mill.

While in the above specification I have described one embodiment which my invention may assume in practice, it will of course, be understood that the same is capable of modification, and that modification may be made without departing 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. A machine of the class described com-

prising a frame, a cutter head mounted on said frame, a grinding mechanism mounted on said frame, a mixing mechanism associated with said frame, a conveying mechanism for conveying the material cut by said cutter head to said mixing mechanism including a conveyor trough, a screw mounted in said conveyor trough, an inclined portion located at one end of said trough, and a radially projecting longitudinally extending blade formed on said screw at a point adjacent to and above the inclined portion of said trough for forcing and conveying the material to said mixing mechanism.

2. A machine of the class described comprising a frame, a cutter head mounted on said frame, a grinding mechanism mounted on said frame, a common shaft for said cutting mechanism and said grinding mechanism, an elevating screw mounted on said shaft, a mixing mechanism associated with said frame, a conveying mechanism including a conveyor screw and a trough located below said cutting mechanism for conveying the material from said cutting mechanism to said grinding mechanism, an inclined portion formed integrally with and on the delivery end of said trough and a radially disposed longitudinally extending portion formed on said screw and coextensive with the inclined portion of said trough for conveying the material from said cutting mechanism to said mixing mechanism.

3. A machine of the class described comprising a frame, a cutter head mounted on said frame, a grinding mechanism mounted on said frame, a mixing mechanism associated with said frame, communication between said mixing mechanism and said grinding mechanism, communication between said mixing mechanism and said cutting mechanism, a conveying mechanism for conveying material in one of two directions comprising a conveyor screw and a trough, valves for controlling the direction in which said material is conveyed, means formed on said screw including a longitudinally and radially extending portion thereof for forcing the material in the direction of the open valve, and an inclined portion formed at the delivery end of said trough underlying the longitudinally and radially extending portion of said conveyor screw.

4. A machine of the class described comprising a frame, a cutter head mounted on said frame, a grinding mechanism mounted on said frame, a mixing mechanism associated with said frame, communication between said mixing mechanism and said grinding mechanism, communication between said mixing mechanism and said cutting mechanism, a conveying mechanism for conveying material in one of two directions comprising a conveyor screw and a trough, valves for controlling the direction in which said material is conveyed, means formed on said screw extending longitudinally and radially with respect to the axis thereof and co-operating with a portion of the trough for discharging and forcing the material through one of the open valves and an inclined portion formed at the delivery end of said trough underlying the longitudinally and radially extending portion of said conveyor screw.

In testimony whereof I have signed my name to this specification, on this 5th day of March, A. D. 1929.

JOHN HOLLAND-LETZ.