L. W. THOMPSON.

ALFALFA REDUCING MACHINE.

APPLICATION FILED SEPT. 18, 1907.

919,090.

Patented Apr. 20, 1909.

3 SHEETS—SHEET 1.

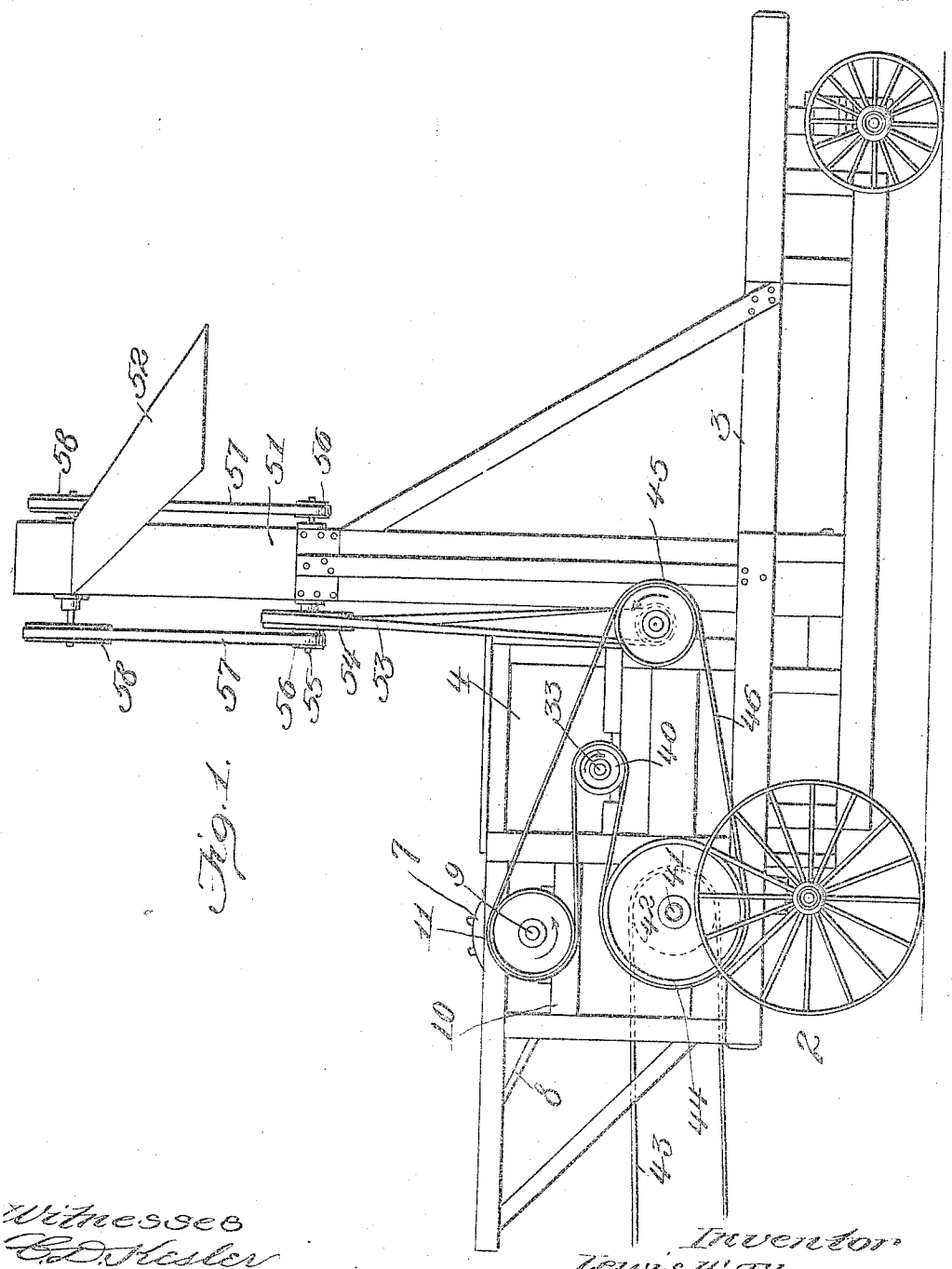



Fig. 1.

Witnesses
C. D. Kasler
H. B. Kasler

Inventor:
Lewis W. Thompson
By James L. Norris
Atty.

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3 SHEETS—SHEET 2.

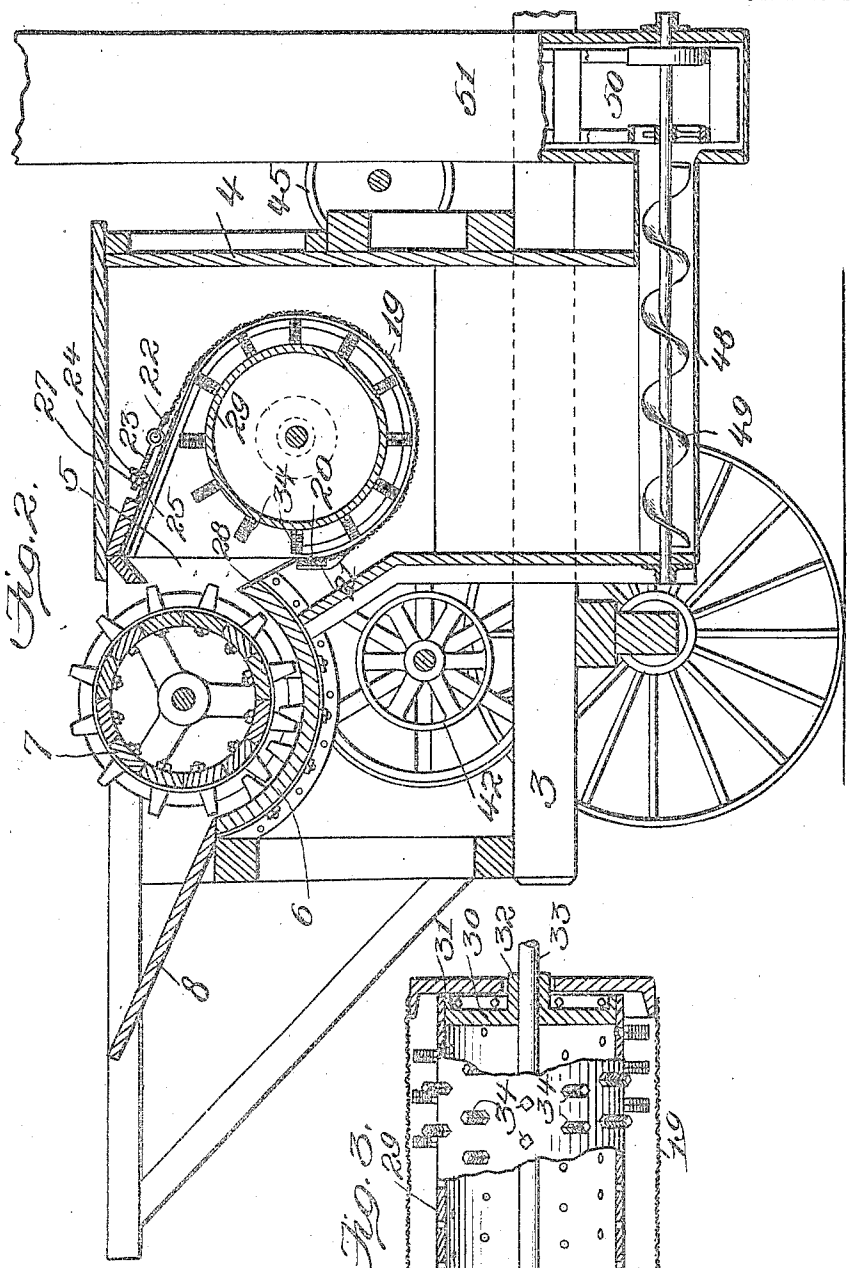



Fig. 2.




Fig. 3.

Witnesses:

Inventor

Lewis W. Thompson

By James L. Norris

Attorney

L. W. THOMPSON.

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3 SHEETS—SHEET 3.

Fig. 4.

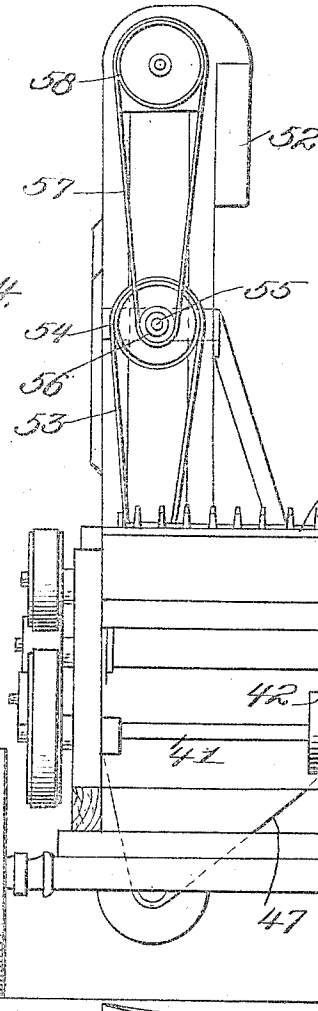



Fig. 5.

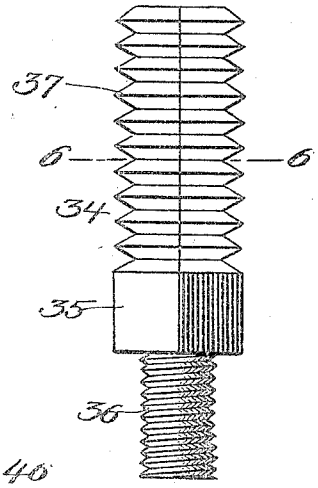



Fig. 6.

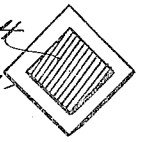



Fig. 7.

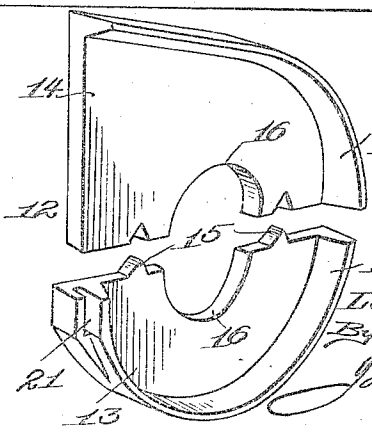
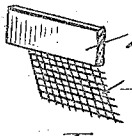



Fig. 8.




Witnesses:

Inventor

Lewis W. Thompson

By James L. Norris.

Atty.

# UNITED STATES PATENT OFFICE.

LEWIS W. THOMPSON, OF OSBORNE, KANSAS.

## ALFALFA-REDUCING MACHINE.

No. 919,090. Specification of Letters Patent. Patented April 20, 1909.

Application filed September 18, 1907. Serial No. 393,482.

*To all whom it may concern:*

Be it known that I, LEWIS W. THOMPSON, a citizen of the United States, residing at Osborne, in the county of Osborne and State of Kansas, have invented new and useful Improvements in Alfalfa-Reducing Machines, of which the following is a specification.

This invention relates to alfalfa reducing machines and particularly to that class thereof for grinding or disintegrating alfalfa hay into meal, the apparatus being portable so that it can be easily moved from place to place.

The object of the invention it to provide a mill of the character set forth which is effective in action and by which the material is rapidly, thoroughly, and uniformly disintegrated without waste.

In the drawings accompanying and forming a part of this specification I have shown in detail one form of embodiment of the invention which, to enable those skilled in the art to practice the same, will be set forth in detail in the following description, while the novelty of the invention will be included in the claims succeeding said description.

Referring to said drawings: Figure 1 is a side elevation of a mill involving my invention. Fig. 2 is a longitudinal sectional view of the rear portion of the same. Fig. 3 is a longitudinal sectional elevation of the disintegrating cylinder, coöperating screen, and certain adjacent parts. Fig. 4 is a rear elevation of the mill. Fig. 5 is a detail view on an enlarged scale of a disintegrating tooth. Fig. 6 is a view on a similar scale of said tooth as seen from below in said Fig. 5. Fig. 7 is a detail view in perspective of one of the members which shape the screen and to which the latter is detachably connected. Fig. 8 is a similar view of a portion of the screen and a bar attached thereto.

Like characters refer to like parts throughout the several figures of the drawings.

It is my custom to mount the various parts of the mill upon a suitable vehicle, such as that denoted in a general way by 2 in Fig. 1, whereby the mill can be readily transported. The vehicle 2 involves in its make-up a body as 3 and upon this body is mounted a suitable casing as 4 which contains a disintegrating cylinder and a coöperating screen hereinafter particularly described, which in conjunction grind or disintegrate the pieces or fragments of alfalfa into powder, granular, or meal form. The casing 4, which may be made of wood or any other desirable material, is located near the rear of the body 3 and it has an inlet opening as 5 through which the partially ground alfalfa is passed.

Extending into the opening 5 is the forward portion of a concave as 6 with which the peripherally toothed cylinder 7 is coöperative, the hay being supplied to the cylinder and concave either by hand or mechanically and being directed thereinto by an inclined feed-board as 8 the delivery end of which rests on the rear end of said concave, as shown clearly in Fig. 2. The shaft of the cylinder 7 is denoted by 9 and it is supported by suitable bearings upon the framing 10 rising from and suitably fastened to the body 3, said framing being also connected with the casing or housing 4 (see Fig. 1 for example). The feed-board 8 to which I have previously referred is connected suitably with said framing 10. To one end of the shaft 9 is fastened a suitably driven member such as the pulley 11, and I will hereinafter set forth the means shown for rotating this pulley.

Within the casing 4 and suitably attached to the sides thereof are two duplicate members, such as those designated each in a general way by 12 (see Fig. 7 where one of said members 12 is shown in detail). I will describe the member 12 shown in said Fig. 7 and this will apply to the other one, as they are of duplicate construction. I prefer to make said member 12 in the form of a cast plate and in the present case it consists of a lower section as 13 and an upper section as 14 adapted to fit edge to edge, the lower section 13 having along its upper edge substantially angular projections as 15 adapted to fit correspondingly-shaped notches in the lower edge of the upper section to thereby prevent relative movement of the two parts. The said members 13 and 14 have semi-circular apertures each denoted by 16 and which are adapted to register or mate to form a circular opening. Said sections 13 and 14 are further provided with inwardly-extending marginal curved flanges as 17 and 18, which, when said sections are in engagement, present substantially a continuous flange, the adjacent ends of said two flanges 17 and 18 at this time being in solid abutment. The flange 17 is practically circular, while the lower portion of the flange 18 is circular, the upper part of said flange 18 being inclined upwardly and rearwardly from the cir-

cular part thereof. The flange 17 and circular part of the flange 18 with similar flanges on the other member 12 shape the screen 19 into the desired curved form, the lateral portions of the screen overlying the outer faces of the several flanges. One end of the screen 19 is connected as by screws, bolts, or in any other desirable manner, with a cross-bar as 20 which may be of wood or metal and the ends of which are adapted to be dropped into slots as 21 in the upper ends of the flanges 17. From this it will be clear that the screen 19 is detachably connected with the members 12. To the other or upper end of the screen is suitably connected a strip as 22 (see Fig. 2 for example) and this strip may be of wood or metal and it has connected therewith the eye of an eye-bolt as 23, the shank of which is passed through the substantially upright flange of an angle-bar as 24 fastened to the upper inclined portions of the flanges 18. The plate 25, preferably made of sheet iron, is fastened in some suitable way to the under side of the transverse board 26 extending between and suitably fastened to the sides of the casing 4. Said plate 25 serves as a guard to prevent the material from passing out over the top of the screen 19 where the bolts 23 are located. The threaded portion of the bolt 23 is embraced by a nut as 27 by turning which the tension of the metal screen 19 may be regulated, it being understood that for this purpose the nut 27 engages against the fixed bar 24. There may be if desired several longitudinally adjustable bolts 23.

To the forward or inner end of the concave 6 there is suitably fastened an inclined apron as 28 which extends downwardly to the bar 20 and which prevents the partially ground material from passing downward through the space between said concave 6 and bar 20. This apron 28 stands at a suitable inclination and it accurately guides the material onto the screen 19. The screen 19, as will be apparent, is removably mounted so that it can be taken from place and one of a different mesh introduced in its stead, whereby the grade of the meal can be readily governed.

The disintegrating cylinder is designated by 29 and it consists preferably of a steel tube of desired diameter provided with end-plates or disks as 30 of duplicate construction, the end-plates or disks 30 having annular flanges as 31 preferably bolted to the cylinder or tube 29. The end-plates or disks 30 have outwardly-extending hubs as 32 keyed or otherwise suitably fastened to the shaft 33 whereby, when said shaft is turned, the cylinder will be also turned. The hubs 32 extend into the openings formed by the registering apertures 16. The cylinder 29 is surrounded for more than half its circumference by the screen 19, the space between the ends of said screen, as indicated in Fig. 2, being substantially coincident with the inlet 5 so as to provide for the proper entrance of the material onto the cylinder 29 from the cylinder 7 and concave 6 and also onto the screen 19. The cylinder 29 is provided with circumferential teeth of any desired number, such as that designated in a general way by 34 (see Fig. 5.) The tooth 34 includes in its make-up a square body as 35 from which the externally-threaded stem 36 extends inward, said stem 36 being tapped into an interiorly threaded opening in the cylinder 29, as shown clearly in Fig. 2. These teeth 34 are arranged in rows longitudinally of the cylinder 29, the teeth of each row being staggered with respect to the teeth of rows at opposite sides of the same, as indicated clearly in Fig. 3, by means of which said teeth occupy the entire circumference of the cylinder so that there will be no annular space or passage between two lateral rows of teeth on said cylinder. In addition to the square bodies 35 the teeth 34 are provided with a ribbed portion 37, square in cross section, the ribs of which act as cutting edges. In the present case the opposite corners of the square bodies 35 and ribbed portions 37 are located in the line of feed of the material so as to facilitate the cutting up or disintegration of the broken up alfalfa resting on the screen 19 and carried therearound by the cylinder 29.

It will be clear that said cylinder 29 is provided with means for positively cutting up stock or material on the screen 19, although there is a conjoint action between the two which results in the thorough grinding of such stock or material.

The shaft 33 is supported by suitable bearings on the framing 10 and it is shown as provided with a pulley 40 (see Fig. 1).

The main shaft of the apparatus is designated by 41 and is provided with a pulley 42 around which the belt 43 from a suitable motor (not shown) is adapted to pass, so that when said motor is in operation, the shaft 41 will be rotated. Said shaft 41 has fastened thereto a pulley or band-wheel as 44 and the framing 10 is shown as carrying at a point forward of the shaft 41 an idler pulley as 45. A belt as 46 is passed around the several pulleys 11, 40, 44, and 45 so as to rotate the same in the direction of the arrows in Fig. 1 when the shaft 41 is turned in the proper direction by the belt 43. The several pulleys 11, 40, 44, and 45 are shown clearly in Fig. 1 as being on one side of the apparatus; they may, as indicated in Fig. 4, be repeated at the opposite side of said apparatus so as to insure a balanced steady movement of the respective shafts to which they are connected.

It will be assumed that the two cylinders 7 and 29 are being rotated and that alfalfa hay is being delivered onto the feed-board 8. This hay passes from the feed-board into the

space between the cylinder 7 and concave 6 and is broken up into small fragments by the conjoint action thereof. The alfalfa fragments are moved forward toward and onto the apron 28 and through the inlet 5 by the rotary movement of the cylinder 7, and such fragments fall onto the cylinder 29 and screen 19 and, as the cylinder 29 rotates, the fragments are carried around and in contact with the screen, the outer ends of the teeth or pins 34 being adjacent to the screen for this purpose. The toothed cylinder 29 breaks up these fragments into granular or meal form and, when the same is sufficiently reduced, it drops through the openings in the screen 19. The partially ground up alfalfa pieces are carried around by the cylinder 29 until they are sufficiently small in size as to pass through the meshes of said screen. The apron 28 prevents the escape of the disintegrated material through the space between the cylinder 29 and the screen 19, while any disintegrated particles that may be carried upwardly by the cylinder 29 are thrown against the plate 25 which, acting as a guard, directs such particles thus thrown up downward on to said cylinder 29.

The bottom of the casing 40 is of hopper shape and is designated by 47 and leads to and communicates with the interior of the casing 48 in which the screw-conveyer 49 is mounted, the shaft of said screw-conveyer being suitably supported and constituting the lower shaft of the endless elevator 50 situated in a housing as 51. The meal falling through the screen 19 passes onto the hopper bottom 47 and is directed thereby into the casing 48 being advanced along the latter by the screw 49 into the casing 51 up which it is advanced by the elevator 50 for delivery therefrom by a chute as 52 into suitable receptacles.

On the shaft to which the pulley 45 is connected is fastened a pulley connected by a cross-belt 53 with the pulley 54 fastened to the countershaft 55 mounted suitably upon the elevator casing 51. The shaft 55 is provided at its opposite ends with pulleys each designated by 56 connected by belts each designated by 57 with the upper pulleys 58 on the upper shaft of said elevator. Such mechanism constitutes a simple means for driving the elevator.

What I claim is:

1. In a mill of the class described, the combination of grinding mechanism for initially grinding the stock, a rotary disintegrating cylinder and a screen, and an inclined apron leading from said grinding mechanism to said screen for delivering the partially ground material or fragments of stock from said grinding mechanism onto said screen, the screen extending partially around said cylinder from said apron to a point substantially at the top of said disintegrating cylinder, the latter and the screen serving conjointly to break up the material on said screen into pieces which, when sufficiently reduced, drop through the openings in said screen.

2. In a machine of the class described, a disintegrating cylinder, a screen partially surrounding the same, two sectional members at opposite sides of the disintegrating cylinder, provided with curved flanges overlapped by the lateral portions of the screen, a bar connected with one end of the screen, said members being slotted to detachably receive said bar, and means connected with the other end of the screen and coöperating with said bar to hold the screen in place.

3. In an alfalfa reducing machine, the combination with an initial grinding mechanism comprising an intercurrent toothed cylinder and toothed imperforate concave, of a secondary disintegrating mechanism receiving therefrom and comprising a cylinder provided with square angularly set teeth formed with cutting serrations, and a screen inclosing said cylinder so as to leave a receiving opening upon one side and operating to retain the stock until sufficiently reduced to pass through the screen.

4. In an alfalfa reducing machine, the combination with an initial grinding mechanism comprising an intercurrent toothed cylinder and toothed imperforate concave, of a secondary disintegrating mechanism receiving therefrom and comprising a cylinder provided with disintegrating teeth, each tooth having a square body and also having a ribbed portion square in cross-section, the ribs of the latter portion being substantially V-shaped, and a screen inclosing said cylinder so as to leave a receiving opening upon one side and operating to retain the stock until sufficiently reduced to pass through the screen.

5. In a machine of the class specified, the combination with an initial grinding mechanism comprising an intercurrent toothed cylinder and toothed imperforate concave, of a secondary disintegrating cylinder receiving therefrom and provided with teeth having cutting serrations, and a screen inclosing said secondary disintegrating cylinder and positioned to receive the partially ground material or fragments of stock from the initial grinding mechanism.

6. In a machine of the class specified, the combination with an initial grinding mechanism comprising an intercurrent toothed cylinder and toothed imperforate concave, of a secondary disintegrating mechanism receiving from the grinding mechanism and comprising a cylinder provided with teeth having cutting serrations and a screen partially surrounding the said cylinder and open adjacent to the grinding mechanism to receive the partially ground material or frag-

ments of stock from the latter mechanism, the disintegrating cylinder being rotated and with the screen serving to break up the material on said screen into pieces which, when sufficiently reduced, pass through the openings in said screen.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

LEWIS W. THOMPSON.

Witnesses:
W. O. LOGAN,
H. J. HILLEBRANDT.