W. L. IRVEN & M. O'BRIEN.

REDUCING MILL.

APPLICATION FILED DEC. 22, 1908.

934,918.

Patented Sept. 21, 1909.

2 SHEETS—SHEET 1.

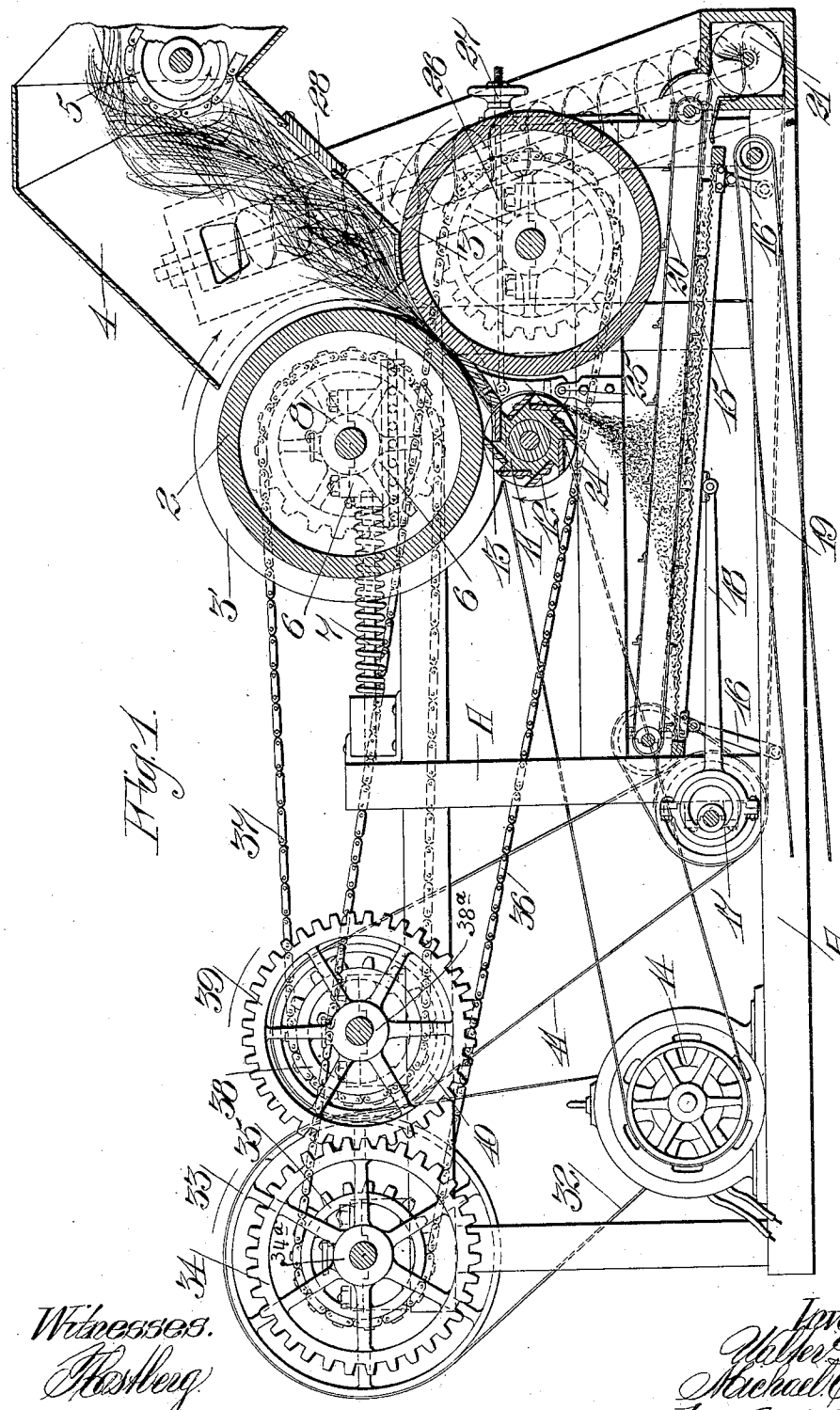

Fig. 1.

Witnesses.
Rosberg
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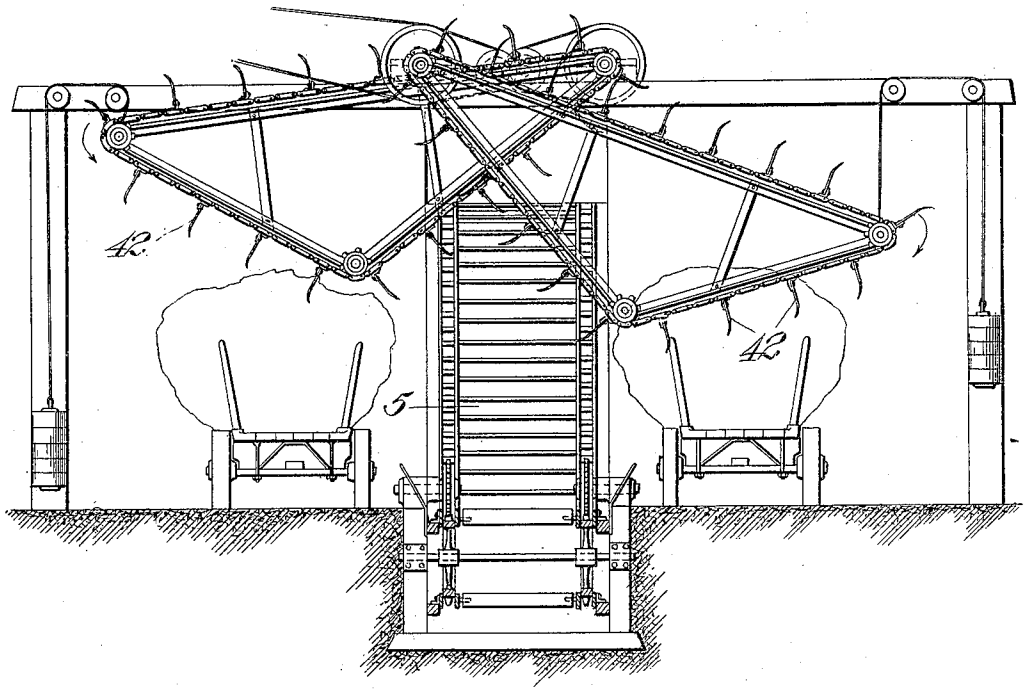

Fig. 2.

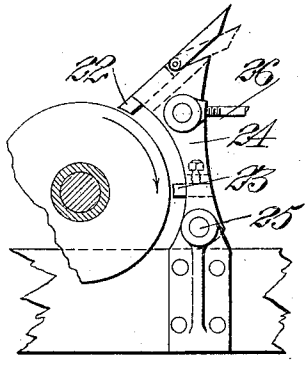

Fig. 3.

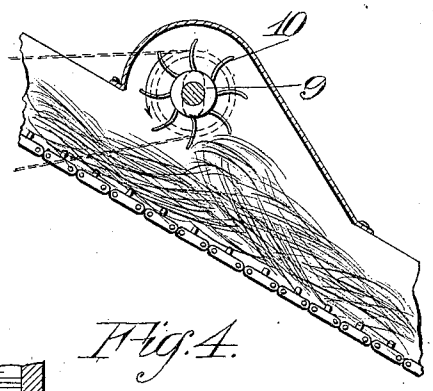

Fig. 4.

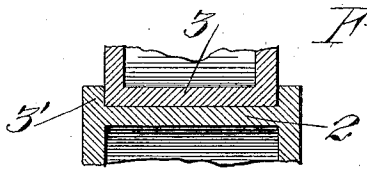

Fig. 5.

Witnesses.
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UNITED STATES PATENT OFFICE.

WALTER L. IRVEN AND MICHAEL O'BRIEN, OF SAN FRANCISCO, CALIFORNIA.

REDUCING-MILL.

934,918. Specification of Letters Patent. Patented Sept. 21, 1909.

Application filed December 22, 1908. Serial No. 468,729.

To all whom it may concern:

Be it known that we, WALTER L. IRVEN and MICHAEL O'BRIEN, citizens of the United States, residing in the city and county of San Francisco and State of California, have invented new and useful Improvements in Reducing-Mills, of which the following is a specification.

Our invention relates to an automatically regulated reducing mill, in which the material, such as alfalfa, is ground into a fine meal; the material being automatically unloaded, spread and fed into the mill.

The invention consists in the combination of parts, and details of construction, of which the following is a complete description.

Referring to the accompanying drawings, Figure 1 is a longitudinal side elevation in section. Fig. 2 shows a means for automatically unloading, distributing and conveying the material to the mill. Fig. 3 is an enlarged view of the grinding and adjusting mechanism. Fig. 4 is a section of the feed gage, or spreader. Fig. 5 is a partial section of the feed-rolls, showing the overlapping edge.

In reducing mills of the kind to which our invention relates, it is a great advantage to have a machine that is automatically operated, and self-adjusting under different conditions and strains. We provide means to prevent choking of the feed rolls, means for adjusting the feed of the revolving cutters so as to produce an even quality of finer or coarser meal; and in different mechanisms which insure a free passage of the material while going through the feed rolls, cutter head, screening mechanism, etc., without liability of choking or blocking the machine at any point, thereby preventing any stops or delays. We accomplish these desirable results by the following construction: A is the main frame of a mill carrying two feed rollers, as 2—3. The material to be reduced is fed into the chute 4 leading to the rollers by any suitably constructed conveyer-belt as shown at 5. One of the feed rollers 2 is mounted on a movable carrier 6, preferably with roller bearings; and this is slidable longitudinally upon the frame A. The roller 2 is forced into contact with the opposite roller by a coil or other spring 7, pushing against the bearing boxes 8 of the roller. This spring-cushioned mounting of one of the rollers is very desirable, allowing the rollers to yield if uneven quantities of material should happen to reach the rollers.

In order that the hay may enter as evenly as possible, we have shown what we term an "automatic feed gage." This may be mounted at any convenient point along and above the conveyer-belt 5. It consists of a cylinder 9 whereon are mounted suitable picker arms 10. This cylinder revolves, and as the material passes, if it is not sufficiently spread by the preliminary feed devices, the arms will catch the bunch and throw it back, allowing only a certain depth of hay to pass, relieving the cutters and feed rollers of any undue strain, and also preventing any chance of the rolls choking. The cutter consists of the cylinder 11, on which are mounted adjustable steel blades 12, the edges of which may be beveled, forming long cutting edges.

The hay after leaving the rollers in a compressed condition, is forced over the shear plate 13 into the blades of the revolving cutter, the cutter being directly connected to the driving motor 14. By varying the speed of the carrier, a finer or coarser product can be produced. The ground or cut material discharging from the cutter, is received on a shaker-screen 15 mounted on the rocker-arms 16. The screen is shaken by suitable connections such as the eccentric 17, and pitman connection 18. The screened material is received on a conveyer-belt 19, or any other suitable means which will convey the material away from the machine. Above the screen is shown a scraper belt 20; this relieves the screen of any coarse materials, and keeps the screen clean and free from clogging. The coarse material discharges into the auger 21, and is elevated and returned through the feed chute 4, to be reground.

The shear plate 13 is so constructed as to form the opposite cutter edge for the revolving cutter. There may be one or more of these edges as 22—23. These are mounted in a frame 24, pivoted at 25, and connected to this frame is a screw-threaded rod 26. By turning the adjusting nut 27, the frame 24 can be adjusted to move to or from the revolving cutter 11; this being one means of adjusting the parts to produce a finer or coarser meal.

The revolving grinder 11^a may be of car-

borundum, or equivalent material, when the material is to be reduced to a flour-like consistency.

The feed and compression rollers may be constructed in any suitable manner, one of which is shown in Fig. 5, and may have overlapping edges as 3′ to prevent the hay from working outside the faces of the rolls.

At the base of the feed chute 4 is placed a magnetic plate 28. This will help to retain any small particle of iron as nails or wire that might enter the revolving cutter and injure the same. The different rollers and belts are driven in the following manner:

Power is transmitted from the motor 14 by a belt 32 to drive a pulley 33, and a gear 34 mounted on the same shaft 34ª. A sprocket-wheel 35 on the same shaft with the gear 34 transmits motion through a chain 36 to the feed rollers 3, and motion is transmitted to the other feed roller by means of a chain 37 driven from a sprocket-wheel 38 which is mounted upon the same shaft 38ª with a gear 39, and this gear meshes with the gear 34, and receives its motion therefrom. From a belt pulley 40 upon one of these shafts, a belt 41 passes around a drum upon the shaft of the eccentric 17, and through this, motion is transmitted to the shaking screen, also to the scraper which passes over it, and may also drive the discharge belt and the elevating screw.

The apparatus is especially designed for grinding hay or alfalfa into a mealy substance, which is prepared in this manner for the market.

By the employment of unloading devices such as are shown in Fig. 2, loads of hay may be driven upon each side of a carrying belt 5 and the teeth 42 of the endless traveling belts passing over the loads, will take small portions of the hay successively, and deliver it upon the carrying-belt 5. This serves to partially distribute the hay, and when in the course of travel of the carrying-belt, it reaches the revolving pickers 9, it is more thoroughly spread and distributed, and passing thence between the rollers 2 and 3, and thence over the feed-plate, and being submitted to the rapidly revolving cutter 12, which is driven directly from the motor 14, the material will be in such condition that it is evenly presented to the cutter or grinder, and thus reduced as finely as may be desired. The first action takes place where the hay passes over the edge of the feed plate 22, and at a point lower down is located another cutter bar 23, between which and the revolving cutter the material must again pass so that the operation when completed, will leave the material in the shape of a fine meal.

Having thus described our invention, what we claim and desire to secure by Letters Patent is—

1. An apparatus for reducing fibrous vegetable material, said apparatus including a revoluble member, co-acting stationary members, and combined compression and feed rolls, a reciprocating receiving screen, a traveling scraper belt above the screen and an elevator carrier to which material from the surface of the screen is delivered by the scraper.

2. An apparatus for reducing fibrous vegetable material, said apparatus including a revoluble member, co-acting stationary members, and combined compression and feed rolls, a reciprocating screen located beneath the pulverizer, an endless scraper belt traveling in contact with the screen, an elevator carrier to which the scraper delivers material from the surface of the screen, and an endless traveling belt below the shaking screen.

3. The combination in an apparatus of the character described, of a feeding and spreading mechanism, a reducing device consisting of opposed revoluble and stationary adjustable members between which the material is passed, a receiving shaking screen, an endless traveling rake passing over the surface of the screen, a return elevator to which the material from above the screen is delivered, and a discharge carrier for the fine product located below the screen.

In testimony whereof we have hereunto set our hands in presence of two subscribing witnesses.

WALTER L. IRVEN.
MICHAEL O'BRIEN.

Witnesses:
GEO. H. STRONG,
CHARLES A. PENFIELD.