

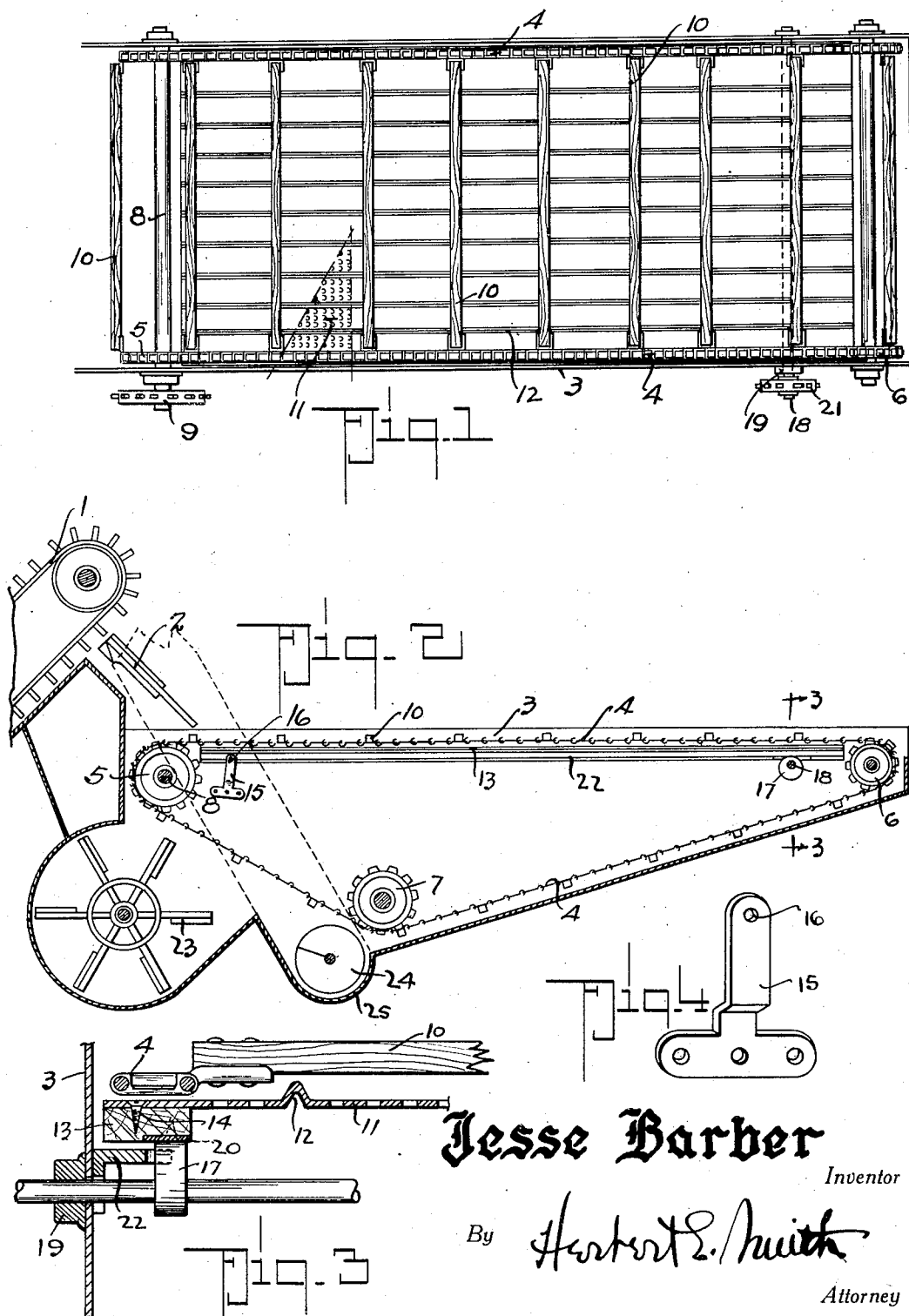
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GRAIN SEPARATOR

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GRAIN SEPARATOR

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My present invention relates to improvements in grain separators of the type employed in the harvester-threshers and combines, as well as in fanning mills and similar appliances. The grain separator of my invention is particularly adapted for use in connection with harvesters that are called on for use and travel over hills, which causes tilting of the implement and of the separator. Under these conditions the grain fed to the separator cannot be uniformly and evenly distributed over the separator screen for efficient service in separating the grain from the chaff. By the adaptation and use of the separator according to my invention, this difficulty and undesired condition are avoided, and the parts of the separator are manipulated so that, regardless of any irregularities in the level of the separator, the material fed thereto may be uniformly and evenly distributed over substantially the entire area of the shoe screen of the separator. Because of this equal and uniform distribution of the material, under adverse conditions, the grain is separated from the fine particles of straw and the chaff, and the latter is disposed of in an efficient manner.

In carrying out my invention, it is to be understood that I do not alter the usual internal mechanisms commonly found in traveling harvesters and still use the usual straw carrier for carrying the straw out the back end of the machine. My invention particularly pertains to a substitution and additions in what is commonly termed the shoe which hitherto has been an agitating device operated by eccentrics to shift the chaff and finer particles of straw toward the rear of the machine, allowing, in that operation, the grain to fall through the sieve or screen where it can be picked up and properly disposed of.

In the present case the agitation of the shoe is eliminated and a chain carrier is substituted for the agitation, which carrier passes rearwardly over the screen to carry off chaff and bits of straw and also move the grain until it passes through the screen or sieve.

In addition to the endless conveyor or carrier, I employ a separator or separating screen which is pivotally mounted at one end below the working flight of the endless carrier and this screen is oscillated or manipulated as will hereinafter be more fully explained.

In the accompanying drawing I have illustrated one complete example of the physical embodiment of my invention wherein the parts are combined and arranged according to the best mode I

have thus far devised for the practical application of the principles of my invention.

Figure 1 is a top plan view of the grain separator embodying my invention.

Figure 2 is a vertical, longitudinal sectional view of the separator.

Figure 3 is an enlarged, vertical, detail sectional view as at line 3—3 of Figure 2.

Figure 4 is a perspective view of a bracket for pivotally supporting the screen.

In order that the general arrangement and relation of parts may be readily understood I have shown in Figure 2 a portion of an endless conveyor or elevator 1 for feeding the material, which passes down over the transversely extending bridge or board 2 to the grain separator that is located in the housing 3. The endless conveyor, draper, or carrier operating in the housing comprises the usual pair of spaced, endless sprocket chains 4, 4, which pass over the main sprocket wheels 6 at the rear or tail end of the conveyor or separator, and the pair of idle or guide sprockets 7 located near the inclined bottom of the housing.

The main sprockets 5 are mounted on the shaft 8 that extends transversely of the housing and is journaled in suitable bearings in its walls, and the drive sprocket 9 on the projecting end of the shaft receives power transmitted thereto in suitable manner from a convenient drive wheel.

The two endless chains 4, 4, are joined by the usual spaced slats 10, 10 spaced apart in customary manner, and the upper working flight of the carrier conveys the material from left to right in Figure 2, the chaff, broken bits of stems, &c. being disposed of at the tail end of the separator; and the separated grain falls through the slatted conveyor to a perforated, reticulated, or wire screen 11 located below the working flight of the carrier.

The screen is of rectangular shape and fashioned of wire or sheet metal that is punched to form the openings through which the separated grain passes during the threshing operations, and integral ribs 12 are fashioned on the top surface of the screen, not only to reinforce the body of screen, but also to support and prevent the carrier and also the screen from sagging.

The screen is rigidly attached at its edges to a rectangular frame 13 by means of screws 14 or in other suitable manner, and as indicated in the drawings the screen extends substantially the full length of the working flight of the carrier. The screen is supported in close proximity to the underside of the carrier, and at one of its ends

the frame of the screen is pivoted or hinged in a pair of brackets 15 that are secured against the inner faces of the side walls of the housing. At its other end the frame and its screen are free to swing on the pivot or hinge 16 of these two brackets, the hinges or pivots as indicated being in a horizontal plane, to provide for an up and down movement of the separator with the greatest degree or extent of movement at the tail end of the separator.

For lifting or agitating the separator screen, and also the carrier, I provide a pair of eccentrics or cam disks 17 fixed to revolve with the eccentric shaft 18 that is journaled in bearings mounted in the walls of the housing at 19, and a wear plate 20 is fixed on the underside of the screen-frame for co-action with the cams or eccentrics. The shaft 18 may be revolved by power applied to the sprocket wheel 21 on the projecting end of the shaft, and the power may be transmitted thereto from any suitable source.

On the inner faces of the side walls of the housing are mounted angle-strips 22 that provide supports for the separator frame and screen when the latter is not supported by the eccentrics or cam disks and these strips provide abutments against which the frame is abruptly bumped as the eccentrics rapidly revolve and thereby agitate the screen with quick rising and falling movement for the purpose of separating the grain from the chaff. The screen is lifted bringing the ribs 12 in contact with the cross slats, and these separator slats also are thereby agitated for the purpose of agitating the chaff as it is advanced toward the tail end by the successive slats. In this manner the material is continuously agitated to assist in separating the grain from the chaff, the chaff is agitated to assist in its movement toward the tail end of the separator, and the grain falling on the screen is agitated and finally falls through the opening in the screen. This continuous agitation of the material on the carrier and on the screen prevents bunching or clogging of the chaff and grains, especially when the separator is not level, as on a hillside where the grain and chaff have a tendency to follow a decline in the surface of the separator and become bunched, as at the corners of the separator. The combined forward movement of the working flight of the carrier, and the agitation of the slats and the screen thus assist materially in the separation of the grain from the chaff. The movement of the slats also insures a regulated travel of the chaff and grain across the screen, regardless of the position of the threshing machine or angle of the ground over which the machine is traveling.

The separation is assisted by a fan-blower 23 located beneath the front end of the separator in a suitable housing. The blast from the blower separates the chaff from the grain and the separated grain falling down the inclined bottom of the housing, from the screen, is conveyed from the interior of the separator housing by suitable

means, as the screw conveyer 24 operating in the transversely disposed trough 25 at the bottom of the inclined bottom-wall of the housing 3.

Since an even distribution of the threshed grain with its chaff and the finer particles of straw is desirable over the entire face of the screen, regardless of the position or inclination in either direction of the harvester, I find that the devices of my invention provide for that condition to the end that better separation is effected and, therefore, less loss of grain that would otherwise pass out with the chaff. Since the endless carrier is operated at a uniform speed it insures the same maximum separation regardless of whether the harvester is going down grade, is mounting a grade, or is inclined to the grade, as on a side hill and since the grain and chaff is divided by the slats of the endless carrier which continuously urges it on its way, there is no drifting of the material when the machine is on a side hill, and no tendency to pass the material from the separator when going up a hill by reason of the inclination of the screen, which would aid in the passage of the material, nor in slowing up or retarding the material when the machine is operating on a decline.

Having thus fully described my invention, what I claim as new and desire to secure by Letters Patent is:—

1. The combination with an endless conveyer including spaced cross-slats, a housing for the conveyer, and fixed bumpers on opposite side walls of the housing, of a grain-separating screen adapted to support chaff and located directly under the working flight of the conveyer and above the bumpers, said screen extending substantially the full length of said working flight and having a pivotal end support, laterally-spaced, longitudinally-extending guide-ribs on the upper face of the screen adapted to contact with the slats, a rotary shaft journaled in the walls of the housing beneath the free end of the screen, a pair of eccentrics on said shaft, and means for directing a flow of air currents upwardly through the screen.

2. In a grain separator, the combination with a housing and an endless conveyer mounted in the housing, of a grain-separating screen adapted to support chaff and located directly under the working flight of the conveyer in the housing, means on the upper face of the screen for guiding the movement of the chaff along longitudinally-extending channels to prevent lateral mass-shifting of the chaff, said screen extending substantially the full length of said working flight and a pivotal support for one end of the screen, means for oscillating the free portion of the screen for intermittent contact of the latter with the under portion of the conveyer, and means for directing flow of air currents upwardly through the screen and conveyer.

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