Mar. 20, 1923. 1,449,044

J. HERCHE

SEPARATOR

Filed June 23, 1920 2 sheets-sheet 1

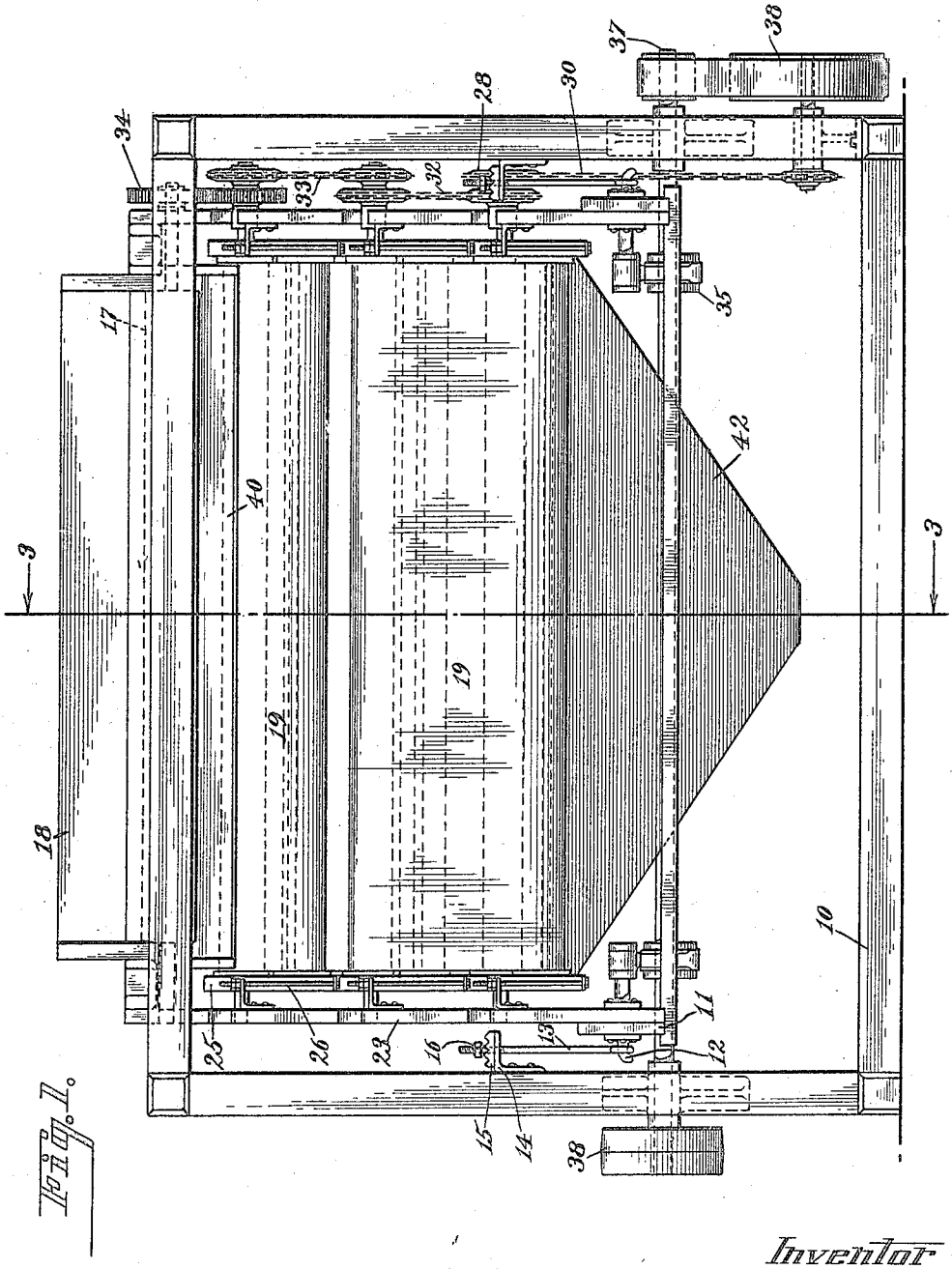


Fig. 1.

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By Chas. E. Townsend.
His Atty.

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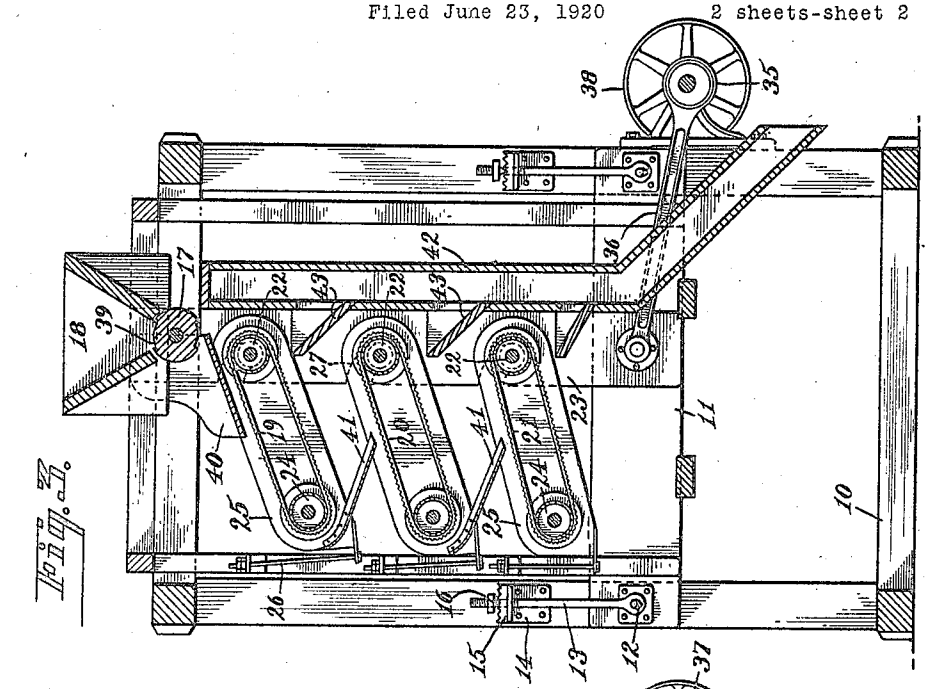


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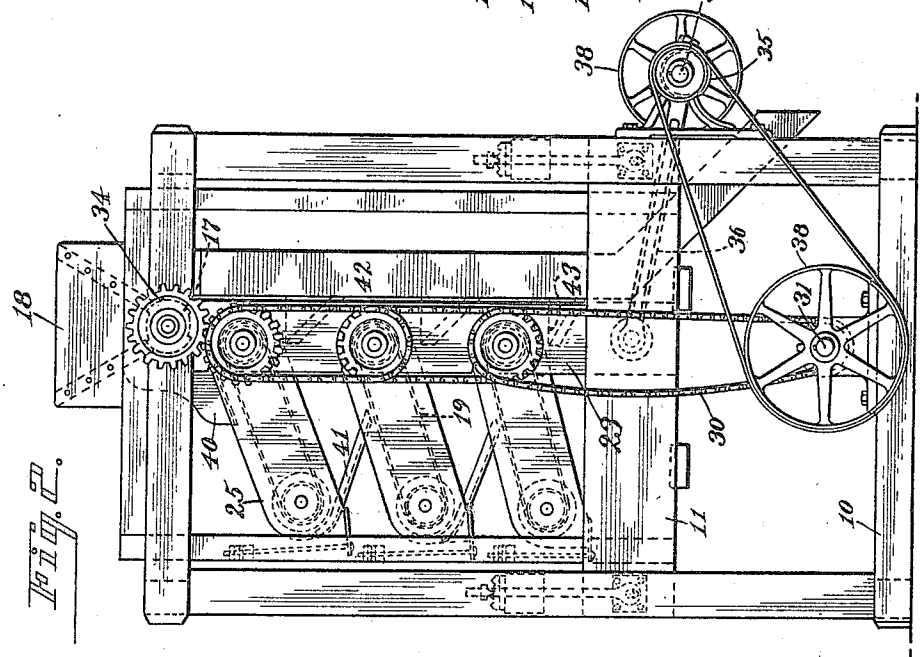


Fig. 2.

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Patented Mar. 20, 1923. 1,449,044

UNITED STATES PATENT OFFICE.

JAMES HERCHE, OF OAKLAND, CALIFORNIA.

SEPARATOR.

Application filed June 23, 1920. Serial No. 391,021.

To all whom it may concern:

Be it known that JAMES HERCHE, a citizen of the United States, residing at Oakland, in the county of Alameda and State of California, has invented a new and useful Improvement in Separators, of which the following is a specification.

This invention relates to separators and has for its object to make possible the separation of various solid substances such as grain, beans, peas and the like wherein the grains or particles are of substantially the same size and shape and cannot, therefore, be separated by ordinary screening methods. For instance, barley and wheat when mixed together cannot satisfactorily be separated by using screens on account of the particles or grains being of substantially the same size and shape. Also, in the harvesting of beans, there is often a considerable quantity of adobe particles mixed with them and these particles frequently are of the same size and shape as the beans. The usual screens are ineffective to separate the adobe from the beans.

In the present invention, I take advantage of the relative difference in the surface texture of the particles of the two components of the mixture to be separated. Thus, a grain of wheat is relatively smooth in comparison with a grain of barley. So also the surface of a bean is much smoother than the surface of an adobe ball. Therefore, I employ a traveling surface constructed of a material which will exhibit different co-efficients of friction for the particles of the two components and arrange this traveling surface upon an incline and impart to it a movement such that the particles whose co-efficient of friction for said surface is relatively small will be discharged at the lower end and those particles whose co-efficient of friction for the surface is relatively high will be carried along by said traveling surface and discharged at the opposite end.

One form which my invention may assume is exemplified in the following description and illustrated in the accompanying drawings, in which:

Fig. 1 shows a side elevation of a separator embodying my invention.

Fig. 2 shows an end elevation of the same.

Fig. 3 shows a vertical central cross-sectional view taken on the line 3—3 of Fig. 1.

The separator in its present form comprises a main frame 10 inside of which is suspended a vibratory frame 11 carried by hooks 12 engaging pendent links 13, which links are supported from the corner posts of the main frame by means of brackets 14. Each bracket supports a notched or serrated washer 15 upon which rests a V-shaped ridge formed on a nut 16 screwed on to the upper end of the link. The upper portion of the vibratory frame 11 is connected with a feed roller 17 about which it swings and is stabilized thereby. Overlying the feed roller 17 is a hopper 18 and beneath the feed roller are a plurality of endless traveling conveyors, three in the present instance, indicated at 19, 20 and 21 arranged one above the other and on inclines which vary as between adjacent conveyors. The uppermost conveyor 19 has the greatest inclination and the lowermost conveyor 21 has the least inclination. The difference in inclination as between adjacent conveyors is not great. For example, in one machine which I have operated successfully, the top conveyor had an inclination of $3\frac{3}{4}$ inches to the foot, the intermediate conveyor was inclined $3\frac{9}{16}$ inches to the foot, and the bottom conveyor $3\frac{7}{16}$ inches to the foot. These conveyors are formed of a friction material such as rubber, having a roughened surface, or textile with a heavy nap. For separating adobe beans, I have obtained excellent results with conveyors constructed of corrugated or fluted rubber similar to the rubber used in door mats, and for separating wheat and barley I find that conveyors formed of strips of carpet produce excellent results.

The conveyors each have a driving roller 22 journaled in uprights 23 carried by the vibratory frame substantially in vertical alignment with the feed roller. Idler rollers 24 are provided for conveyors, being journaled between side bars 25, which side bars form the conveyor frame. Each conveyor frame is supported pivotally at its upper end by the driving conveyor roller 22 and at its lower end is supported by an adjustable link 26 so that the angle of the conveyor may be varied as desired. Furthermore, each conveyor frame may be independently inserted and removed by unfastening the link 26 and withdrawing the driving roll from its bearings through slots 27 formed in the uprights 23.

On the spindle of the lowermost driving

roller 22 is a sprocket wheel 28 driven by a chain 30 from a counter shaft 31 arranged on the base of the main frame. There is a second sprocket wheel on the spindle of the lower driving roll which drives the middle roll by means of a sprocket chain 32, and the middle roll in turn drives the upper roll through a chain 33. Finally, the upper roll drives the feed roll through spur gears 34. Reciprocating movement is imparted to the vibratory frame by an eccentric 35 and a strap 36. The shaft 37 of the eccentric constitutes the power shaft and through a belt and a pulley drives the counter shaft 31.

The feed roll 17 is preferably provided with a plurality of pockets or flutes 39 of varying depth increasing from front to rear whereby to prevent crushing of the grain or material as it is carried past the bottom of the hopper. A deflector or guide 40 is placed between the feed roll and the first conveyor, and deflectors 41 are arranged between adjacent conveyors extending from the lower end of one to the middle portion of the other whereby to distribute the material from one to the other. A delivery chute 42 extends vertically along the discharge ends of the conveyors and has branches 43 extending out to receive the material from each conveyor.

In operation, material from the hopper is fed to the first conveyor and all conveyors are driven in the same direction moving upwardly at their upper runs. The speed of travel and the inclination of the conveyors are so regulated that one class of material, as for instance wheat, will roll or slide down the conveyor under the influence of the vibratory movement imparted thereto and be discharged at the lower end. The particular material of which the conveyor is constructed will prevent particles having rough surfaces, such as barley, from rolling or sliding down and consequently this class of material will be discharged at the upper end of the conveyor and enter the delivery chute 42. The material discharged from the lower end of the first conveyor passes on to the succeeding conveyor for further treatment and a similar operation takes place again, except that the second conveyor is not so steeply inclined as the first and consequently a closer separation will occur. The material passing out at the lower end of the second conveyor is again acted upon by the third conveyor which is still less sharply inclined, and as a result thereof a very close separation is effected based upon the relative coefficients of friction of the particles of each class of material for the traveling belts.

The power shaft 31 and the driving rollers being all substantially in vertical alignment and substantially in line with the point about which the vibratory frame swings, it will follow that the movement of the said vibratory frame will be the same on either side of the power shaft. In consequence of this, a slight amount of slack in the sprocket chain 30 will be sufficient to permit the necessary motion of said vibratory frame, and such slack will in nowise interfere with the operation of the chain.

Various changes in the construction and arrangement of the several parts may be employed without departing from the spirit of my invention as disclosed in the appended claims.

It will be noted that the greater portion of the separating action occurs at the uppermost belt or conveyor 19 and the subsequent belts or conveyors are of importance only in connection with materials which are exceedingly difficult to separate and which, therefore, require subsequent treatment. It follows therefore that an operative machine might embody but one belt or conveyor.

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

1. A separator comprising a stationary frame, a feed roller thereon, a vibrating frame mounted to swing about said feed roller, a plurality of superimposed inclined endless belts mounted on the vibrating frame, a shaft on the vibrating frame for actuating said belts, a drive shaft on the stationary frame, said shafts being substantially in vertical alinement with the feed roller, and sprocket and chain mechanism connecting said shafts.

2. A separator comprising a stationary frame, a feed hopper having a feed roller mounted on said frame, a vibrating frame mounted for swinging movement about said feed roller, a plurality of superimposed inclined endless belts mounted on the vibrating frame, means for independently adjusting the incline of said belts, a drive shaft journaled in the stationary frame, and sprocket chain mechanism connecting said shaft to said belts whereby the belts may be driven in unison and in a direction to cause their upper flights to travel upwardly.

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

JAMES HERCHE.

Witnesses:
JOHN H. HERRING,
W. W. HEALEY.