R. J. OWENS.

GRAIN SEPARATOR.

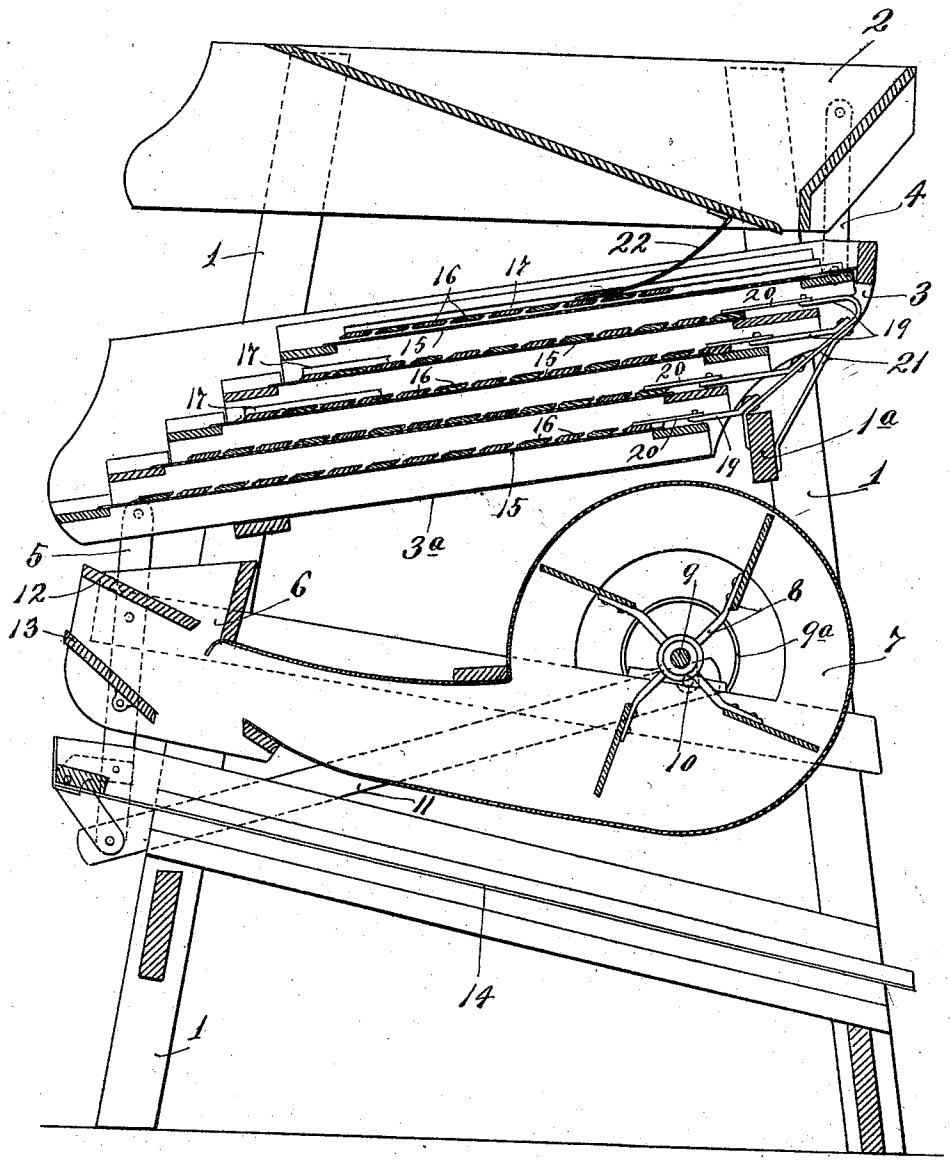
APPLICATION FILED JAN. 14, 1911.

1,005,778.

Patented Oct. 10, 1911.

2 SHEETS—SHEET 1.

Fig. 1



Witnesses.
A. H. Opsahl.
Harry J. Opsahl.

Inventor
Robert J. Owens.
By his attorneys.
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2 SHEETS—SHEET 2.

Fig. 3

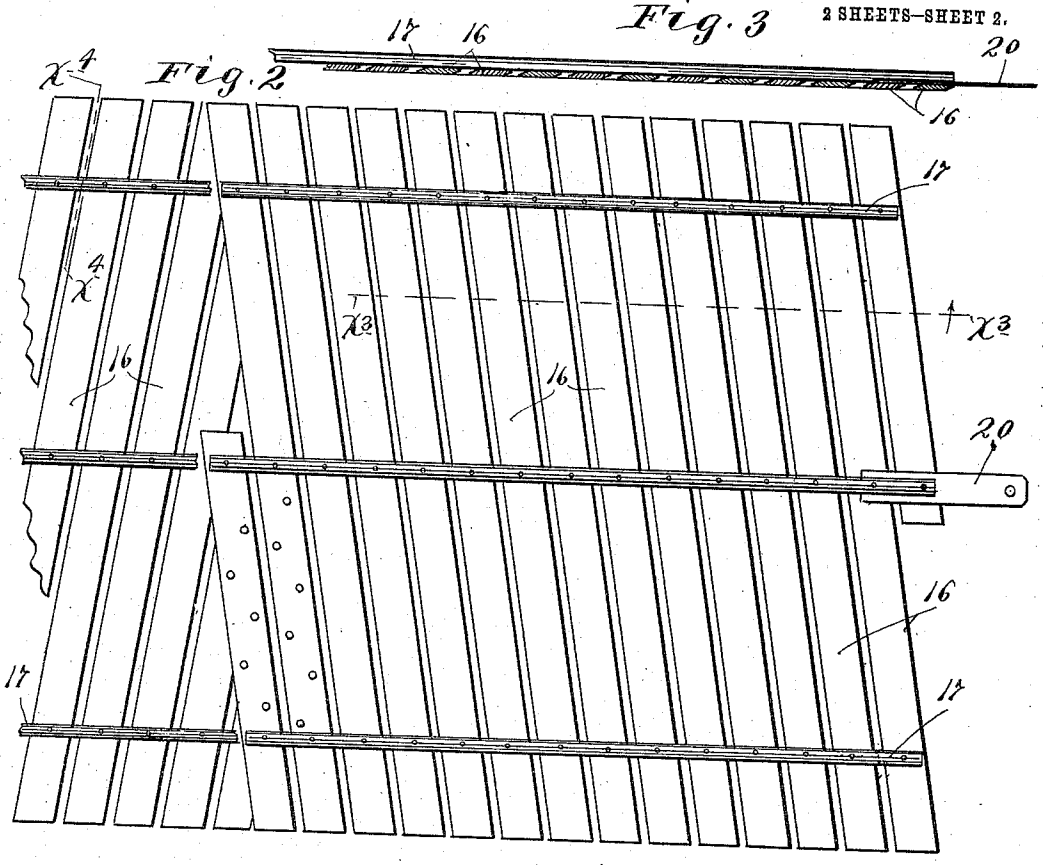

Fig. 2

X4

Fig. 4

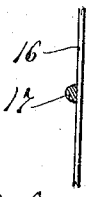

Fig. 5

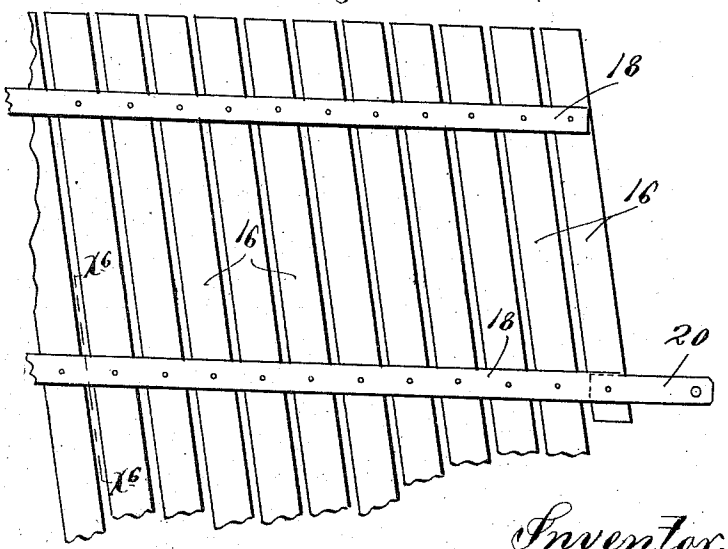

Fig. 6

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UNITED STATES PATENT OFFICE.

ROBERT J. OWENS, OF MINNEAPOLIS, MINNESOTA.

GRAIN-SEPARATOR.

1,005,778. Specification of Letters Patent. Patented Oct. 10, 1911.

Application filed January 14, 1911. Serial No. 602,633.

To all whom it may concern:

Be it known that I, ROBERT J. OWENS, a citizen of the United States, residing at Minneapolis, in the county of Hennepin and State of Minnesota, have invented certain new and useful Improvements in Grain-Separators; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention is directed, particularly, to the improvement of that type of separator which is adapted for the separating of "succotash", to-wit, a commingled stock consisting of wheat, oats and various small foreign seeds.

Generally stated, the invention consists of the novel devices and combinations of devices hereinafter described and defined in the claims.

The objects particularly sought for and accomplished by my invention are large capacity in respect to the amount of separation accomplished, and high efficiency in respect to the character of the separation. These advantages are accomplished chiefly by the provision of sieve riders of novel construction and arrangement. Each such novel sieve rider is made up of a multiplicity of slats, preferably wooden slats spaced apart, so that gaps are formed between their adjacent edges, and with the slats extended obliquely in respect to the direction of the longitudinal inclination of the coöperating sieve. In some instances, the slats of the rider are connected by stiff connecting strips, such as wood, while in other instances, they are connected by flexible strips, such as leather straps. The advantages of this novel construction and arrangement of the sieve riders will be fully stated after first having described, in detail, a grain separator embodying riders constructed and arranged in accordance with my invention.

In the accompanying drawings which illustrate the said machine, like characters indicate like parts throughout the several views.

Referring to the drawings, Figure 1 is a vertical section taken longitudinally and centrally through the machine; Fig. 2 is a plan view showing two overlying riders, the interposed sieve being removed from between the same; Fig. 3 is a vertical section taken on the line x^3 x^3 of Fig. 2; Fig. 4 is a detail in section taken on the line x^4 x^4 of Fig. 2; Fig. 5 is a plan view showing one of the riders, some parts being broken away and illustrating the construction in which the rider slats are connected by flexible strips; and Fig. 6 is a detail in section taken on the line x^6 x^6 of Fig. 5.

The framework of the machine is indicated as an entirety by the numeral 1. This framework, at its top, supports a grain supply hopper 2 of the usual or any suitable construction. Receiving from and working below the hopper 2 is a sieve-equipped shoe, the body or frame of which is indicated as an entirety by the numeral 3. This shoe 3 is mounted for endwise vibratory movements longitudinally of the machine and, as shown, is supported at one end from the sides of the hopper 2, by links 4, and at its other end is supported by the upper ends of vibratory levers 5. As shown, the levers 5 are intermediately pivoted to the sides of the end portion of an air discharge spout 6 that is connected to a fan case 7, which latter is suitably supported by the framework 1 below the shoe 3. An ordinary fan head 8 works within the fan case 7 and its shaft 9 is shown as provided at one end with a crank 10 that is connected, by a pitman 11, to the lower end of one of the shoe supporting levers 5. In this way, endwise vibratory movements longitudinally of the machine are imparted to the sieve shoe 3.

The numerals 12 and 13 indicate, respectively, grain and air deflecting boards located in the delivery portion of the air discharge spout 6.

A screen 14 is arranged to reciprocate below the fan and to receive the wheat, which has been separated from the oats and which is directly delivered thereto from the deflecting board 12. This screen 14, however, forms no part of my present invention and it may be of any suitable construction and may be mounted and operated in any suitable way, not necessary for the purposes of this case to consider. If employed, its function would be to separate small seeds and other fine foreign materials from the otherwise clean wheat.

In the machine illustrated, the power for reciprocating the sieve shoe 3 is transmitted thereto through the levers 5 and cranks 10, and the fan shaft 9 is assumed to be driven

by a belt (not shown) which would run over a pulley 9ª located on one end of the fan shaft 9.

The features of my invention, as incorporated in the machine illustrated, will now be considered.

The endwise vibratory shoe 3 is provided with a multiplicity of longitudinally inclined sieves 15, preferably in the form of perforated zinc or other sheet metal plates, suitably secured to the said shoe. The perforations in all of the sieves 15, except the upper one, may be of the same size, but the perforations in the upper sieve are preferably large enough to insure the passage therethrough of all of the wheat and a great deal of the oats, but small enough to carry off, as tailings, all such material as broken straw or chaff. Otherwise stated, this upper screen 15 is a chaffing screen. The perforations in all of the said screens, except the upper screen, are large enough to pass wheat therethrough but small enough to cause oats held flat against the faces of the screens to slide over the screens, to the lower or delivery ends thereof. Below the lower screen 15, the shoe 3 carries an inclined imperforate deck 3ª. Arranged to rest directly upon the upper surface of each of the said screens 15 is a so-called rider, constructed in accordance with my invention, and made up of a multiplicity of rider slats 16, preferably formed from thin wooden strips and having their upper or receiving edges obliquely undercut or beveled, so that the wheat and oats will slide under the same. The upper portions of the rear edges of these slats are also preferably beveled to thereby afford better clearance for the passage of the wheat and oats and other seeds through the spaces between the slats and, hence, under the slats, so that especially the oats will be held flatwise on the faces of the screens. In the construction shown in Figs. 1, 2, 3 and 4, the slats 16 are shown as connected by wooden strips 17, while in the construction shown in Figs. 5 and 6, the said slats are connected by flexible straps 18. Preferably, the slats are formed with a multiplicity of perforations which permit some of the grain to pass therethrough and, hence, under the slats, thus increasing the separating efficiency of the machine. The slats are extended obliquely to the longitudinal direction of the machine or, in other words, obliquely to the direction of inclination and vibration of the sieves 15. This is highly important as will presently more fully appear. Furthermore, the slats of the one rider are oblique in one direction, while the slats of an overlying or underlying rider are oblique in the opposite direction. Otherwise stated, the inclination or angle of the slats of the several sieve riders are alternated in respect to each other. This is also important as will hereinafter more fully appear.

To secure the best results, the riders above described should not reciprocate or vibrate with the seives 15, but should remain relatively stationary. To accomplish this, the riders on all of the seives 15, except the upper one, are anchored, at their upper ends, as shown, by means of arms 19 and straps 20, to an anchor bracket 21 rigidly secured to a cross bar 1ª of the machine frame 1. The rider on the upper sleeve 15 is shown as anchored to the bottom of the hopper 2, by a bar or metal strap 22, and it is shown as terminated at its upper end short of the upper ends of the other riders, so that the succotash will fall from the hopper directly on the upper portion of the upper sieve 15.

Operation: In machines of this kind, there is a tendency for the grain or material which is to be separated, in passing over the sieves, to collect in a central stream flowing over the sieves in greatest bulk at the central portions thereof. My improved riders prevent this action and cause the grain to be spread out over the entire surface of the sieve. When the grain falls upon one of the riders, it will quickly work itself under the slats thereof and the oats will be held flat on the faces of the sieves 15, so that the tendency is to carry off oats at the lower ends of each sieve, while the wheat, which is rounded, and fine seeds, will pass successively through the perforations of the sieve and will finally be delivered onto the imperforate deck 3ª of the shoe 3, and from thence will be delivered through the blast from the fan and onto the screen 14. In the repeated actions of the riders on the grain or stock, the stock will, as stated, be spread out over the entire surface of the sieves. The oblique arrangement of the slats will cause a drift of the grain first on one sieve, toward one side of the shoe, and then on a lower sieve toward the other side of the shoe. Under this alternate drifting and spreading action, the total distance traveled by the stock over the several sieves will be very much greater than the aggregate longitudinal dimensions of the several sieves 15. This, as is evident, increases the separating efficiency of the machine or, in other words, has all the advantages that could be obtained by the use of much longer sieves. Thus compactness is given to the machine, by permitting the use of shorter sieves than otherwise would be efficient and, also, the cost of the sieves and, hence, of the machine is reduced. These advantages have their obvious importance.

One important reason for anchoring the riders so that the sieves will move longitudinally in respect thereto is that, by this arrangement, the grain or stock will be worked much more rapidly under the slats

of the said riders, thereby increasing the rate of the travel of the stock and correspondingly increasing the separating capacity of the machine. In some instances, however, the riders may be arranged to move with the sieves.

All of the oats, except possibly "pin oats," will be discharged from the sieves 15, at the lower end of the shoe 3. When the wheat drops from the deck 3ª and deflecting board 12 through the blast of the fan, any chaff, dust or any light pin oats which may still be mixed therewith will mostly be blown therefrom. Any material, such as sand or small seeds, still remaining with the wheat will pass through the screen 14.

It has been stated in the preferred arrangement of the riders they are anchored against vibratory movements with the sieves. This means that they are not connected for vibratory movements with the sieves but does not mean that they are positively connected so that they cannot partake of any part of the movement of the sieves. When the slats are connected by the flexible straps, some of the riders' slats may partake of a slight part of the sieve movement, but the sieve movement, even in this case, will be much greater than the movement of the slats so that the stock will be positively worked under the slats.

What I claim is:

1. The combination with a sieve, of a rider therefor, made up of a multiplicity of rider slats and coöperating elements connecting said slats and partaking of such movements as are imparted to the slats, the said rider, as an entirety, being gravity-held on said sieve and being removable as an entirety from said sieve, substantially as described.

2. The combination with an inclined vibratory sieve, of a rider therefor made up of a multiplicity of slats extended obliquely in respect to the direction of the inclination of the sieve and connected with gaps between their adjacent edges.

3. The combination with an inclined vibratory sieve, of a rider therefor made up of a multiplicity of slats extended obliquely in respect to the direction of the inclination of the sieve and connected with gaps between their adjacent edges, and means anchoring the said rider against vibratory movements against said sieve.

4. The combination with a vibratory sieve shoe having a multiplicity of overlying inclined sieves, of riders for the said sieves, each made up of a multiplicity of rider slats extended obliquely in respect to the direction of the inclination of the said sieves, the angle of the obliquity of the slats of the sieve riders being alternated so that the stock will be caused to drift in one direction on an overlying sieve and in an opposite direction on an underlying sieve.

5. The combination with a vibratory sieve shoe having a multiplicity of overlying inclined sieves, of riders for the said sieves, each made up of a multiplicity of rider slats extended obliquely in respect to the direction of the inclination of the said sieves, the angle of the obliquity of the slats of the sieve riders being alternated so that the stock will be caused to drift in one direction on an overlying sieve and in an opposite direction on an underlying sieve, and means anchoring the said riders against vibratory movements with said sieves.

6. A sieve rider made up of a multiplicity of rider slats and flexible strips connecting the same with gaps between the adjacent edges of said slats.

7. A sieve rider made up of a multiplicity of perforated rider slats connected with gaps between their adjacent edges.

8. The combination with a sieve, of a rider therefor made up of a multiplicity of perforated rider slats connected with gaps between their adjacent edges.

9. The combination with a sieve, of a rider therefor made up of a multiplicity of perforated rider slats and flexible strips connecting the said slats with gaps between their adjacent edges.

10. The combination with an endwise vibratory inclined sieve, of a rider therefor anchored against movement with the said sieve and made up of a multiplicity of rider slats, and flexible strips connecting the same with gaps between the adjacent edges of said slats, the upper edges of the said slats being undercut, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

ROBERT J. OWENS.

Witnesses:
HARRY D. KILGORE,
F. D. MERCHANT.