No. 739,349. PATENTED SEPT. 22, 1903.

# W. M. RUSSELL.

## GRAIN SEPARATOR.

APPLICATION FILED MAY 4, 1903.

NO MODEL. 2 SHEETS—SHEET 1.

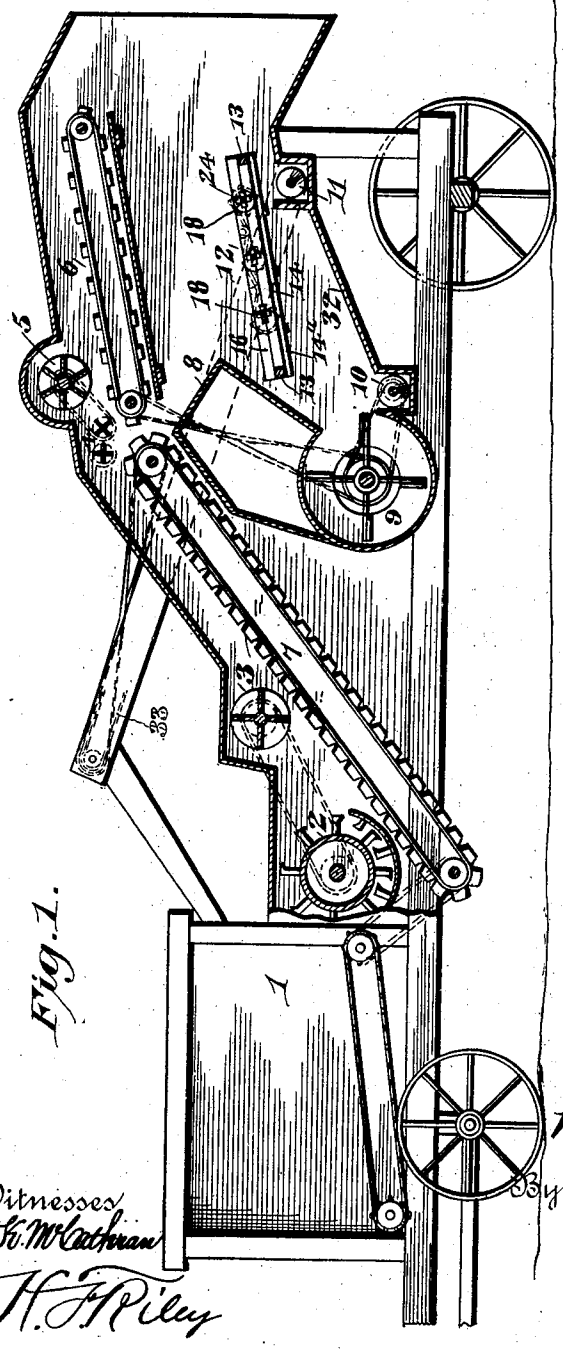


Fig. 1.

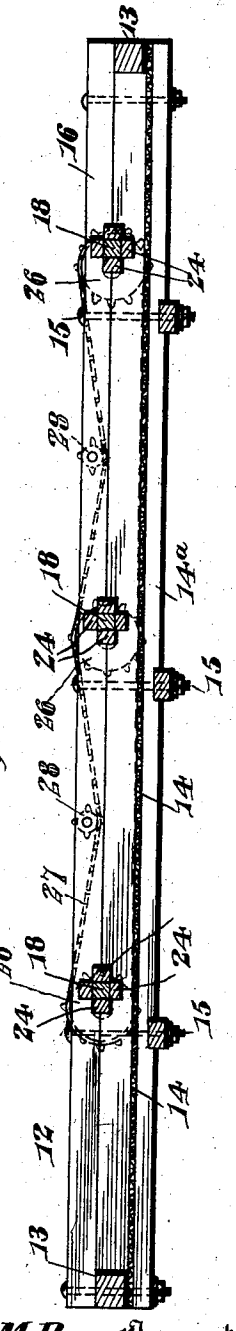


Fig. 2.

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GRAIN SEPARATOR.

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NO MODEL. 2 SHEETS—SHEET 2.

Fig. 3.

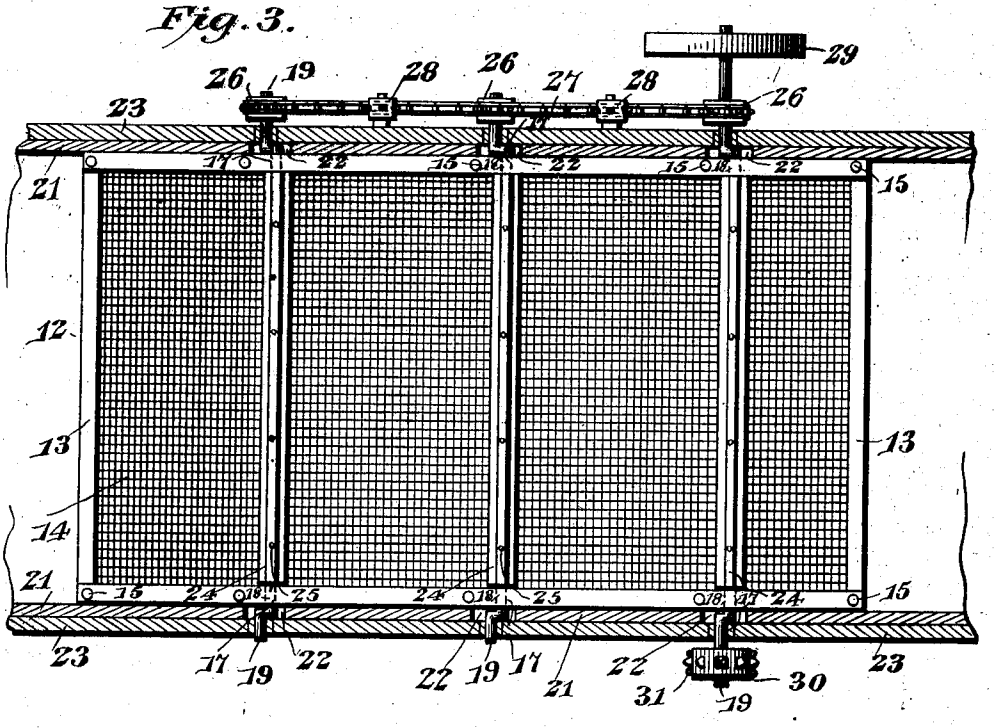



Fig. 4.

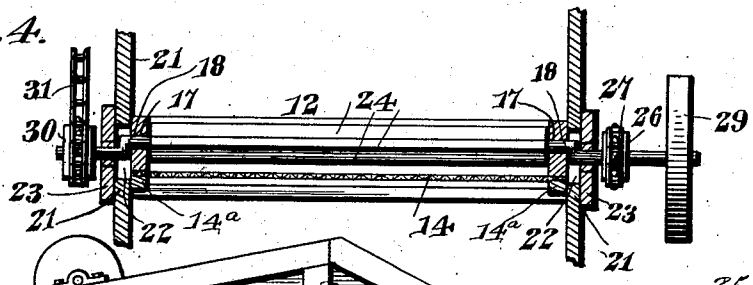



Fig. 6.

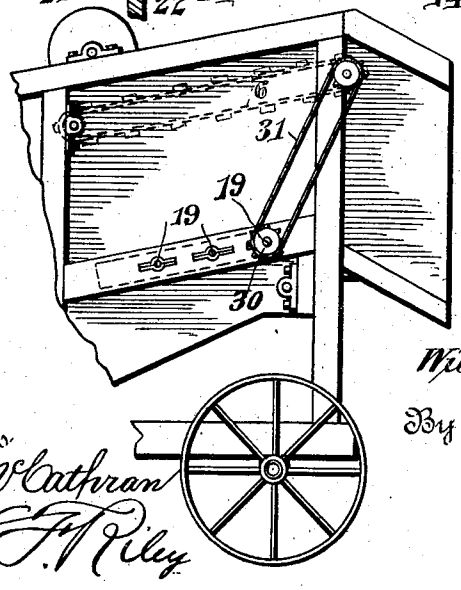
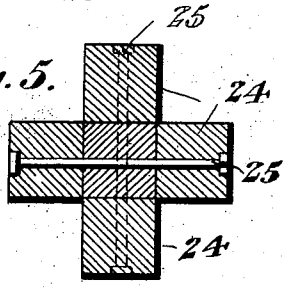



Fig. 5.




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No. 739,349. Patented September 22, 1903.

# UNITED STATES PATENT OFFICE.

WILLIAM M. RUSSELL, OF WALSH STATION, CALIFORNIA.

## GRAIN-SEPARATOR.

SPECIFICATION forming part of Letters Patent No. 739,349, dated September 22, 1903.

Application filed May 4, 1903. Serial No. 155,623. (No model.)

*To all whom it may concern:*

Be it known that I, WILLIAM M. RUSSELL, a citizen of the United States, residing at Walsh Station, in the county of Sacramento and State of California, have invented a new and useful Grain-Separator, of which the following is a specification.

The invention relates to improvements in grain-separators.

The object of the present invention is to improve the construction of grain-separators, more especially the construction of the vibratory shoe and its agitators for separating the grain from the chaff, straw, weeds, and the like, and to provide an exceedingly simple and inexpensive shoe of great strength and durability, and to enable the means for operating the agitators to simultaneously actuate the shoe.

The invention also has for its object to provide a grain-separator of this character having a series of crank-shafts journaled on the main frame or casing and to connect both the shoe and the agitators with the crank-shafts, whereby the agitators will be rotated and the shoe vibrated by the rotation of the crank-shafts.

With these and other objects in view the invention consists in the construction and novel combination and arrangement of parts hereinafter fully described, illustrated in the accompanying drawings, and pointed out in the claims hereto appended, it being understood that various changes in the form, proportion, size, and minor details of construction within the scope of the claims may be resorted to without departing from the spirit or sacrificing any of the advantages of the invention.

In the drawings, Figure 1 is a side elevation, partly in section, of a grain-separator provided with my improvements. Fig. 2 is a longitudinal sectional view of the shoe. Fig. 3 is a horizontal sectional view illustrating the arrangement of the shoe and the gearing for operating the same. Fig. 4 is a detail transverse sectional view illustrating the manner of mounting the shoe. Fig. 5 is a detail sectional view of one of the agitators. Fig. 6 is a side elevation of the rear portion of the grain-separator, illustrating the arrangement of the gearing for driving the crank-shafts.

Like numerals of reference designate corresponding parts in all the figures of the drawings.

1 designates a feeder-house of an ordinary grain-separator; 2, the cylinder; 3, the lower beater; 4, the pickers; 5, the top beater; 6, the straw-carrier; 7, the grain-conveyer; 8, the dummy-board; 9, the fan; 10, the grain-discharge auger; 11, the grain-return auger, and 12 the shoe. The shoe consists of a solid oblong frame 13 and a sheet 14 of screen material, preferably constructed of woven wire and with a mesh of three-fourths of an inch by one-fourth of an inch; but any other desired size of mesh may be employed. The sheet 14 of screen material is arranged beneath the frame 13 and between the same and a lower frame $14^a$, which reinforces the shoe. The frame $14^a$ is composed of side bars and connecting cross-bars, and both frames 13 and $14^a$ are preferably constructed of hard wood and are connected by upright bolts 15 or other suitable fastening devices. The shoe is also reinforced by upper longitudinal side bars 16 and is provided at opposite sides with bearings 17 for crank-shafts 18. These crank-shafts 18 are provided at their ends with cranks formed by an intermediate crank-bend, which extends entirely across the shoe. The ends 19 of the crank-shafts are journaled in suitable bearings at opposite sides of the main frame or casing of the main separator. The crank portions 20 of the crank-shafts are journaled in suitable bearings at opposite sides of the shoe, the bearings of the shoe being formed between the side bars of the frame 13 and the upper reinforcing side bars 16. The sides 21 of the main frame or casing of the grain-separator are provided with slots or openings 22, in which the cranks operate, and the said sides 21 are also reinforced by side pieces 23, arranged on the exterior of the grain-separator and provided with suitable boxes or bearings for the ends of the crank-shafts, which support the shoe and which move the same longitudinally and also raise and lower the shoe, the upward-and-downward movement thereof being equal to the longitudinal movement, as will readily be seen.

The agitators for separating the grain from the chaff, straw, and weeds consist of a series of bars 24, preferably constructed of hard wood and secured by bolts 25 to the faces of the intermediate portions of the crank-shafts. The intermediate portions of the crank-shafts are squared and extend from one crank to another. The bars 24 are also rectangular in cross-section and fit against the flat faces of the squared portion of each crank-shaft, as clearly illustrated in Fig. 5 of the accompanying drawings. By this construction the crank-shafts support the shoe and the agitators and rotate the latter within the shoe and at the same time actuate the shoe, moving the same both longitudinally and upward and downward. The crank-shafts are provided at one side of the grain-separator with sprocket-wheels 26, which are connected by an endless sprocket-chain 27, whereby the crank-shafts will be simultaneously rotated. Idlers 28 may be employed, if desired, to preserve the proper tension of the sprocket-chain to insure a positive operation of the intermediate crank-shaft. The rear crank-shaft is provided at the side of the machine at which the sprocket-chain 27 is located with a balance-wheel 29, and the said rear crank-shaft is provided at the other side of the machine with a sprocket-wheel 30, which meshes with a sprocket-chain 31, driven from the rear shaft of the straw-carrier 6, as clearly indicated in Fig. 6 of the drawings. Instead of, however, arranging the gearing for operating the crank-shafts as shown any other desired arrangement may be provided for effecting this result.

In the operation of the grain-separator the material from the feed-house is fed to the shoe by the grain-conveyer 7, the grain discharged from the conveyer passing down the dummy-board 8 and onto the screen at the feed end of the shoe, any straw, weeds, or other bulky material carried up by the grain-conveyer being under the operation of the pickers 4 carried over onto the straw-carrier, whence it is discharged through the end of the separator-casing to a dump, as by an ordinary conveyer, such as is usually employed in connection with machines of this character. The chaff and wheat, together with any other foreign substance fed to the shoe by the grain-conveyer, are subjected in the shoe to a violent agitation through the movement of the shoe and to the action of the rotary agitators, whereby the grain is effectively separated from the chaff and other material and the loss of grain reduced to a minimum. The grain falling through the shoe passes downward through a chute 32 to the discharge grain-auger 10. Grain and other heavy material passing over the rear end of the shoe may be returned to the feeder-house by a conveyer 33. The chaff is driven out of the rear end of the casing by the action of the fan 9.

It will be apparent that the shoe is simple, strong, and durable and that it is capable with the rotary agitators of effecting practically a perfect and complete separation of the grain from the chaff and other matter. Also it will be clear that the crank-shafts perform the triple function of supporting the shoe and actuating the same and the agitators within the shoe.

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

1. In a machine of the class described, the combination of a shoe, and crank-shafts supporting the shoe and actuating the same and provided with agitators, substantially as described.

2. In a machine of the class described, the combination of a shoe, and agitators, of crank-shafts receiving and supporting the shoe and the agitators and actuating the former and rotating the latter, substantially as described.

3. In a machine of the class described, the combination of a shoe, agitators, and crank-shafts supporting the shoe and the agitators and vibrating the former and rotating the latter, substantially as described.

4. In a machine of the class described, the combination of crank-shafts having end cranks journaled in suitable bearings and forming an intermediate crank-bend, a shoe supported by the cranks and vibrated by the same, and agitators supported by the intermediate portions of the crank-shafts and rotated within the shoe by the same, substantially as described.

5. In a machine of the class described, the combination with a main frame or casing, of a plurality of crank-shafts journaled at their ends in suitable bearings of the main frame or casing and having intermediate crank-bends, a vibrating shoe supported by the crank-bends, and rotary agitators mounted on the intermediate portions of the crank-shafts, substantially as described.

6. In a machine of the class described, the combination with a main frame or casing, of crank-shafts journaled thereon and provided with crank-bends and provided with intermediate polygonal portions, a shoe supported by the crank-bends, and agitator-bars secured to the polygonal portions of the shafts and extending longitudinally of the same, substantially as described.

7. In a machine of the class described, the main frame or casing, in combination with the transverse shafts mounted in the said frame or casing, the shoe, the agitators arranged across the shoe, and means for vibrating the shoe and moving the agitators from the transverse shafts, substantially as described.

8. In a machine of the class described, the combination with a main frame or casing, of a plurality of transverse crank-shafts journaled at their ends in suitable bearings of

the main frame or casing and having intermediate crank-bends, and a vibrating shoe supported by the crank-bends, said shafts being spaced apart transversely of the shoe and forming both the support for the shoe and the operating means therefor and agitators arranged above the shoe and operated by the crank-shafts, substantially as described.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in the presence of two witnesses.

WILLIAM M. RUSSELL.

Witnesses:
F. X. WIESENHOFER,
J. J. BUCKLEY.