Sept. 13, 1927. 1,642,331

F. BUNSE

GRAIN SEPARATOR

Filed Aug. 26, 1926

Fig.1.

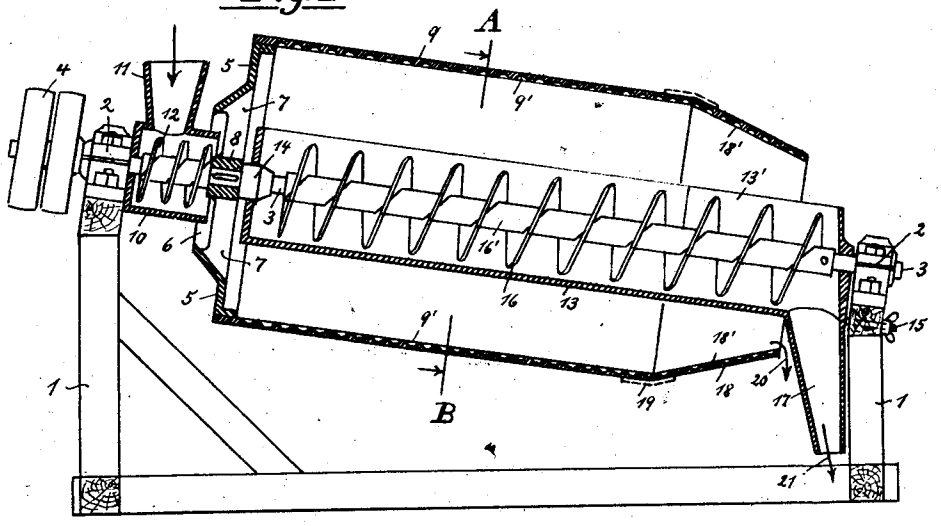


Fig.2.

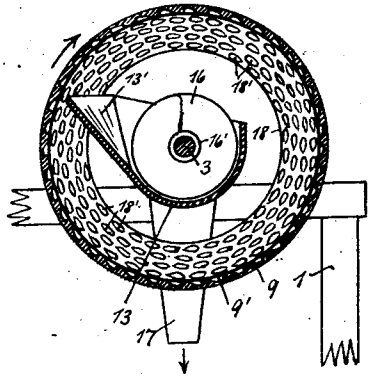


Fig.3.

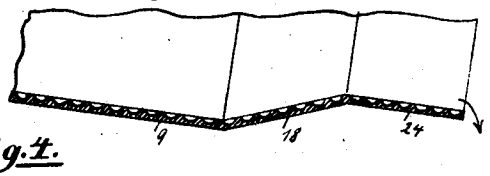


Fig.4.

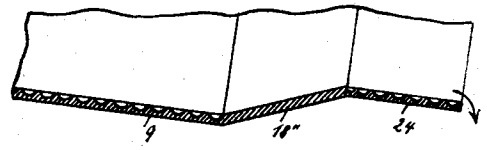
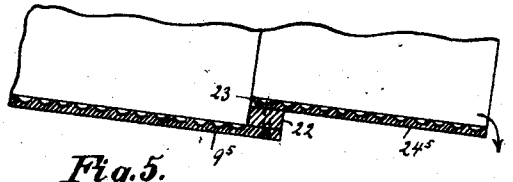


Fig.5.



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UNITED STATES PATENT OFFICE.

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GRAIN SEPARATOR.

Application filed August 26, 1926, Serial No. 131,751, and in Germany August 27, 1925.

My invention relates to grain separators, such as are used for separating tares from the grain, and for separating one kind of grain from another and similar purposes. Such separators consist substantially of a revolving cylindrical drum provided on its inner surface with grooves or cells for raising one kind of grain. In the drum is a collecting hopper with a worm for conveying away the grain which has been raised. In order to increase the output of such separators the speed of revolution is increased. An example of this kind of separator is shown in my previous specification No. 1,590,723 of 29th June, 1926.

In separating for instance, wheat from oats, when almost all the grain is raised by the drum cells into the collecting hopper and only a few grains reach the outlet end of the drum, too many grains of wheat will be left in the separated oats. My invention is based on the recognition of the fact that this incomplete separation is due in the first place to a too great speed of revolution of the separating cells; the layer of mixed grains, which is very thin at the end of the drum, consisting frequently only of single grains, tends to jump about on the drum and only in rare cases reaches the rapidly moving drum cells. My invention consists in this that the diameter of the cylindrical separating drum is reduced at the outlet end of the same, thus providing a separating zone, under which the separating cells travel at a slower speed. This reduction in the diameter of the drum may either be gradual or in steps, the reduced portion alone or this portion together with an adjacent cylindrical portion forming the separating zone, under which the cells travel at a reduced speed. My invention covers all these possible means of construction, the accompanying drawing showing several constructional forms by way of example, to which the invention is not intended to be limited.

In the drawing, Figure 1 is a diagrammatic view of the separator according to the present invention in vertical longitudinal section. Figure 2 is a cross section on the line A—B of Figure 1. Figure 3 shows a second constructional form of the invention, in partial longitudinal section and Figure 4 a modified form of the same. Figure 5 shows another constructional form in longitudinal section through a part of the separator.

According to Figures 1 and 2, a somewhat inclined driving shaft 3 is journalled in bearings 2 mounted on the frame 1, belt pulleys 4 being for instance provided on the shaft for driving it from a motor. A disc 5 having a funnel shaped central opening 6 is supported by arms 7 on a hub 8 keyed to the driving shaft 3. On the disc 5 is mounted the separating drum 9 which may be fixed to it by means of screws, by welding or the like. The inside of the drum 9 is provided with the well known sorting cells 9′. Into the opening 6 in the funnel-shaped part of the disc 5 reaches, for instance, a stationary cylindrical casing 10 which is provided with a filling hopper 11 for the grain to be separated and is co-axial with the driving shaft 3. On the driving shaft 3 within the casing 10 is a worm conveyor 12 which conveys the grain to the drum 9. The drum cells 9′ raise the grains to be separated into a hopper 13, one end of which is supported in the drum 9 on the shaft 3, for instance on a ring 14 mounted on a ball race. The other end of the hopper is suspended directly on the shaft 3 and can be fixed to the frame 1 by a screw 15, preferably in an adjustable manner. On the hopper 13 is a rotatable worm conveyor 16, the hub 16′ of which can be fixed to the driving shaft 3 and which conveys the raised grains to the outlet 17 of the hopper. According to the present invention a tapered portion 18 is provided at the outlet end of the cylindrical separating drum 9, which is also provided with sorting cells 18′ and through which the mixed grains must pass before leaving the drum. This tapered portion 18 may be made integral with the drum 9 as shown in Figure 1, or may form a separate part which must then be connected to the drum 9 in a suitable manner for instance by means of a ring 19 surrounding both parts, as shown in broken lines in Figure 1. The drum 9 performs the main part of the separating work, raising the greater portion of the grain into the hopper 13 and allowing only a small amount of the grain to pass into the tapered part 18 through which the hopper 13 is extended, the collecting wall 13′ of the hopper being set back in this portion if necessary (see Fig. 2). In the tapered part 18 the grain is gradually pushed into zones, the cells 18′ of which revolve at a considerably slower speed than the cells 9′. In these zones at the end of the drum the grains to be separated are given

time to fall into the cells 18′, by which they are raised into the hopper 13. The grain leaving the drum 9, 18 at 20 will be thoroughly clean. At 21 the grains raised by the cells 9′ and 18′ leave the separator.

The constructional form shown in Figure 3 differs from that shown in Figures 1 and 2, in that a short separating cylinder 24 is provided at the end of the tapered part 18. As indicated diagrammatically in Figure 4, in such a constructional form a tapered part 18″ may be without cells, so that it acts only as a means for conveying the grain from the cell drum 9 to the cell drum 24.

In the constructional form shown in Figure 5 two cylindrical cell drums 9^5, 24^5 of different diameter are inserted one in the other, being connected by a ring 22. When the axis of the drum is suitably inclined, the grain to be separated will climb without any auxiliary means over the shoulder 23.

The manner in which the separating drum is mounted is immaterial. Hence the invention is applicable to separators or sorters in which the separating drum is not mounted on a driving shaft (3) but on rollers, such as are shown for instance in Patent 945,497.

The axis of the drum may also be arranged horizontally.

What I claim is:—

1. A grain separator comprising in combination a rotatable cylindrical drum having recesses in its inner surface for receiving the grains and an extension at the delivery end of the drum also having recesses on its inner surface which extension decreases in diameter to the delivery end thereof, as and for the purpose set forth.

2. A grain separator comprising in combination a rotatable cylindrical drum having recesses in its inner surface for receiving the grains and an extension at the delivery end of the drum also having recesses on its inner surface which extension tapers to the delivery end thereof, as and for the purpose set forth,

3. A grain separator comprising in combination a rotatable cylindrical drum having recesses in its inner surface for receiving the grains, an extension at the delivery end of the drum, also having recesses on its inner surface which extension tapers to the delivery end thereof, and a cylindrical extension at the delivery end of the said tapered extension, having the same diameter as the smallest diameter thereof and having recesses on its inner surface, as and for the purpose set forth.

4. A grain separator comprising in combination a rotatable cylindrical drum having recesses in its inner surface for receiving the grains, a smooth tapered extension at the delivery end of the drum and a second cylindrical drum of the same diameter as the small end of the tapered extension and having recesses in its inner surface for receiving the grains, as and for the purpose set forth.

In testimony whereof I have signed my name to this specification.

FRITZ BUNSE.