

(No Model.)

L. W. MACOMBER.  
CENTRIFUGAL GRAIN AND STRAW SEPARATOR.

No. 541,769.

Patented June 25, 1895.

Fig. 1.

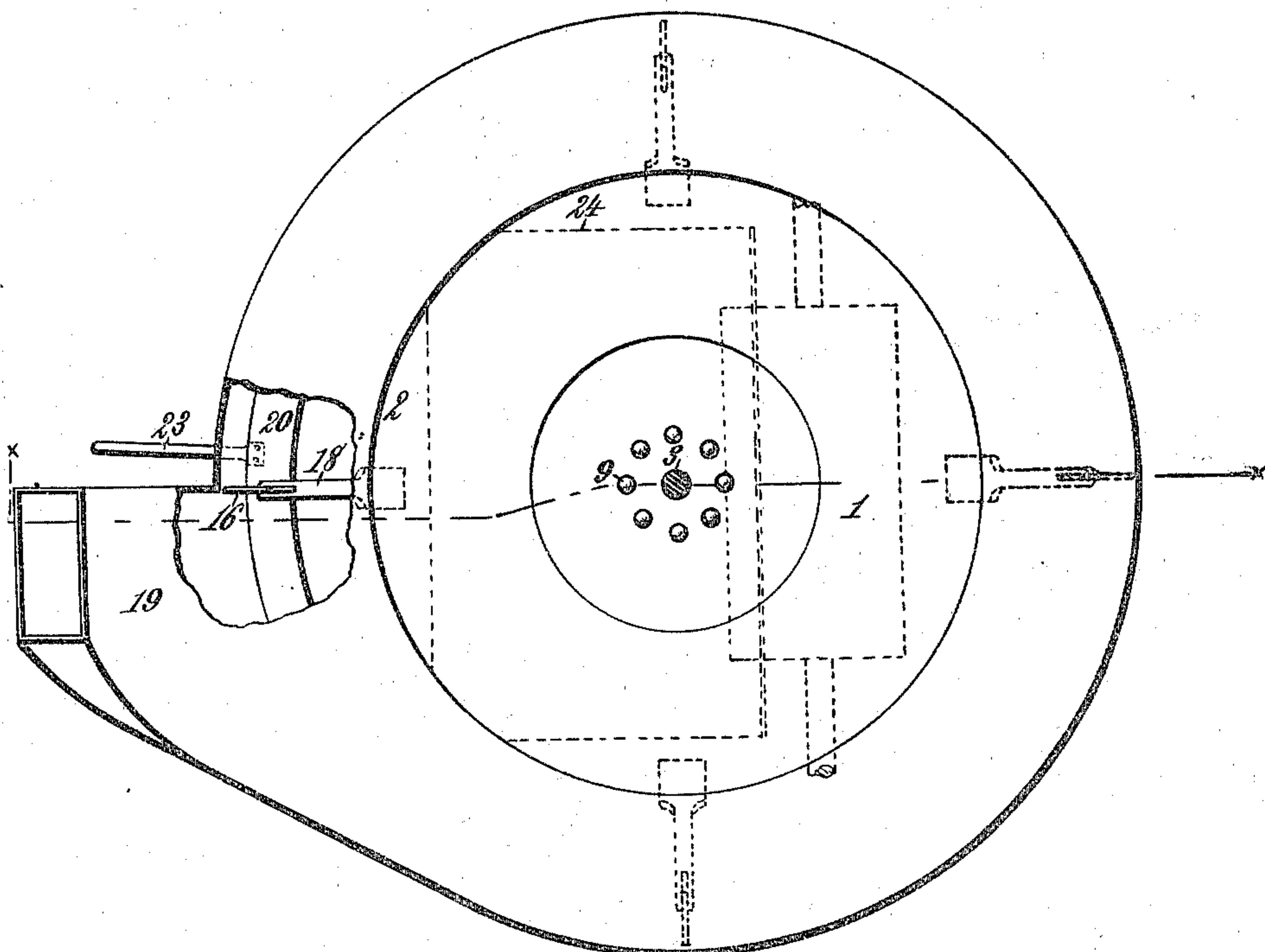
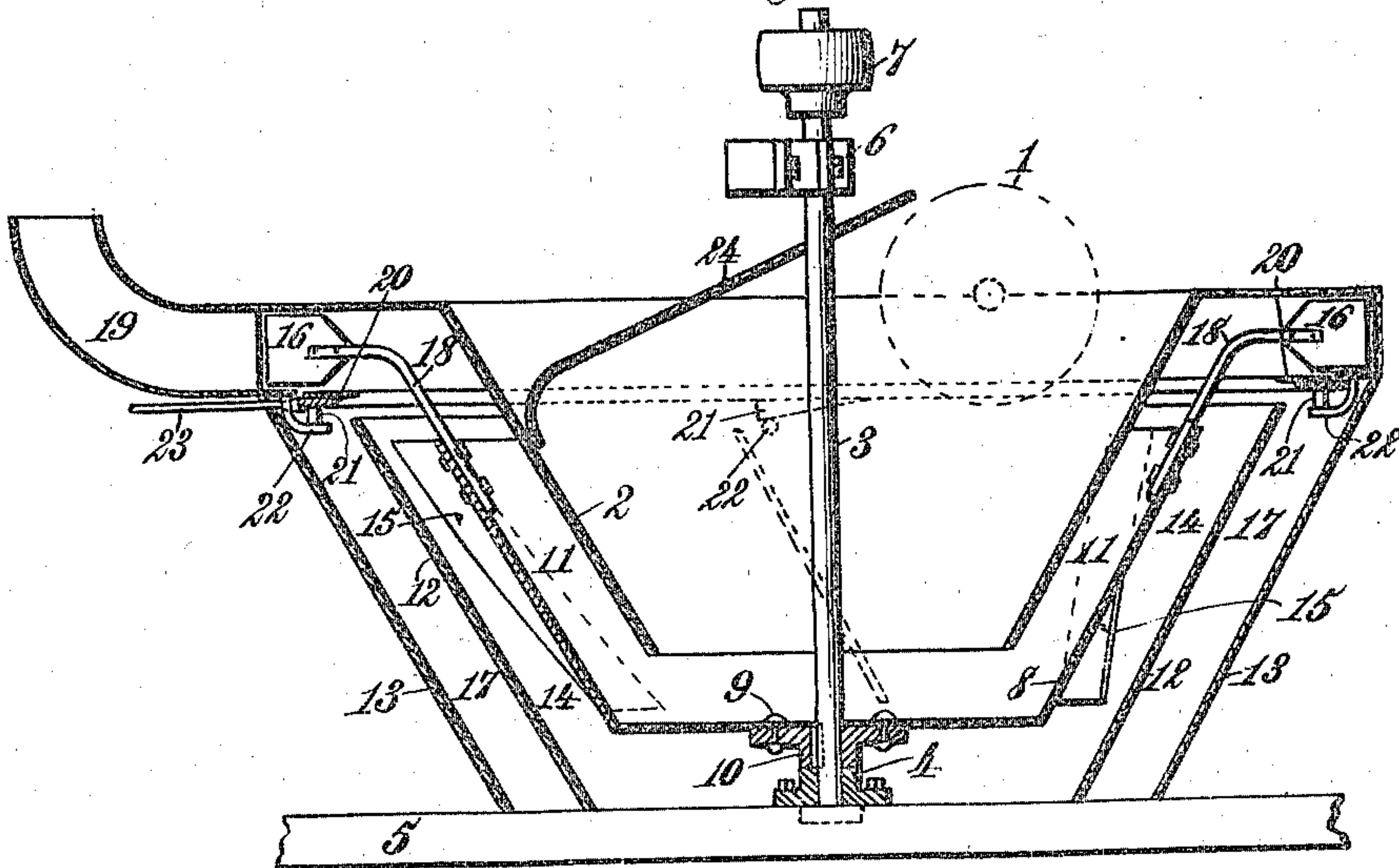


Fig. 2.



Witnesses.  
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# UNITED STATES PATENT OFFICE.

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## CENTRIFUGAL GRAIN AND STRAW SEPARATOR.

SPECIFICATION forming part of Letters Patent No. 541,769, dated June 25, 1895.

Application filed March 30, 1895. Serial No. 543,891. (No model.)

*To all whom it may concern:*

Be it known that I, LYNNE W. MACOMBER, a citizen of the United States, residing at Battle Creek, in the county of Calhoun and State of Michigan, have invented new and useful Improvements in Centrifugal Grain and Straw Separators, of which the following is a specification.

It is the object of my invention to apply the principle of centrifugal action to the separation of grain from straw; and to provide an apparatus capable of attachment beneath or adjacent to a thrashing cylinder and having such construction and mode of operation that the grain and straw thrown from the thrashing cylinder will be received in a funnel shaped receiver, be drawn therefrom at one end and thrown, by currents of air and by centrifugal force, against the inner periphery of a revolving drum through which the grain and straw are separated by centrifugal action aided by currents of air induced along the outside of said rotary drum to produce a blast that will blow the separated straw and chaff away from the grain while the latter is allowed to escape through a separate outlet.

The invention is illustrated in the annexed drawings, in which—

Figure 1 is a plan of my improved grain and straw separating apparatus; and Fig. 2 is a central vertical section of the same on the line  $x-x$  of Fig. 1.

The reference numeral 1, in the drawings, designates a thrashing cylinder of any usual or suitable construction, and which may form part of an ordinary thrashing machine.

Below and partly inclosing the thrashing cylinder, or in any other convenient and proper relation thereto, is located a funnel shaped receiver 2 that is open both at top and bottom. This receiver 2 is preferably stationary and may be supported in any convenient or appropriate manner. The funnel shaped receiver 2 should be so located and arranged that it will readily receive the grain and straw thrown off from the thrashing cylinder.

A rotary-shaft 3 is placed vertically through the center of the funnel-shaped receiver and is extended above and below the same. At its lower end the shaft 3 may be stepped in a

bearing 4 provided on a suitable sill or beam 5, and above the receiver 2 another shaft-bearing 6 is provided. The shaft 3 may be rotated by power applied through a pulley 7, or any suitable gearing.

As shown in Fig. 2, a conoidal shaped rotary-drum 8 is mounted on and carried by the vertical shaft 3 in such manner as to surround the greater part of the lower portion of the stationary funnel or receiver 2 and revolve around but at a distance from the same. The bottom of this rotary-drum 8 is closed and may be securely fastened by bolts 9 to the upper horizontally flanged portion of a boss 10 secured to the shaft 3 immediately above its step-bearing, or at some other convenient point below the receiver. The side walls of the rotary-drum 8 are inclined so as to flare outwardly and upward to correspond with the inclined walls of the funnel-shaped receiver 2, but do not extend so far as the top of said receiver.

At its top the conoidal shaped rotary-drum 8 is open. The interior of the funnel-shaped receiver 2 communicates at the bottom with the annular spaces between the stationary receiver and the surrounding rotary-drum 8 in such manner as to provide a passage 11, Fig. 2, on all sides, for exit of the grain and straw delivered from the thrashing cylinder. In this annular passage-way 11 the grain and straw are carried upward and outward by the centrifugal action caused by rotation of the drum, during which operation the centrifugal force, together with the air currents drawn through the passage 11, will effect a thorough separation of the mingled materials.

The rotary-drum 8 is surrounded at a suitable distance by an upward and outwardly flaring casing 12, and this, in turn, is surrounded by an outer casing 13 of similar form. Between the outside of the rotary-drum 8 and the inner casing 12 is an annular passage 14, Fig. 2, open at top and bottom. In the annular passage 14 are arranged a number of vertically inclined fan blades 15 that are rigidly secured to the outside of the flaring rotary-drum 8, so as to be revolved with said drum. By the action of these fans 15 upward air currents are induced on the outside of the rotary drum, the air being drawn upward



from between the spaced apart sills or beams 5 into the annular passage 14, through the same and out at the top. The induction of upward air currents may be also facilitated 5 by means of fans 16 arranged above the annular space 17, between the casings 12 and 13 and carried by arms 18 attached at intervals to the top of the rotary drum.

The grain and straw delivered by the thrashing cylinder into the funnel or receiver 2, and carried by centrifugal action upward through the inner annular passage 11, will be completely separated on arriving at the top of the rotary-drum. At this point the wheat or 15 other grain, escaping from the open top of the outwardly flaring rotary-drum 8, will be thrown by centrifugal force outward and over into the top of the outer annular passage 17 between the inner and outer casings of the apparatus. Through this passage 17 the separated grain will descend by gravity and may be conducted off through suitable outlets at the bottom. In the meantime the upward draft of air currents, induced by the action 25 of the fans 15 in the intermediate annular passage 14, outside the rotary-drum, will blow off the straw and any light chaff mingled therewith, and these will pass out between the fans 16 above the descending outlet passage 17 for the grain. The action of these fans 16 30 will cause upward air currents of sufficient strength to carry the straw and chaff away from the grain passage 17 and prevent them from falling therein. The blast caused by the fans 16 will force the straw from the machine to the stack through any suitable funnel or tube 19, thus constituting a wind stacker.

In order to more effectually assist in the separation of the grain from the chaff and 40 straw there may be arranged at the top of the outer casing 13 an annular partition or wind board 20, under which the grain will pass downward into the passage 17, while the chaff and straw are blown outward above said partition; and, if desired, the partition may be 45 provided with suitable means for giving it a vertical adjustment. As a means for effecting this vertical adjustment, the under side of the board or partition 20 may be provided 50 with wedges 21 resting upon and adapted to slide on stationary supports 22 secured in the outer casing of the apparatus. On the movable partition 20 is a lever 23, through which a partial rotation may be imparted to the partition to cause the wedges 21 to ride on the 55 supports 22 and thus raise or lower the partition according to the direction in which the lever 23 is moved. By this vertical adjustment of the partition 20 the inlet into the annular wheat passage 17 may be increased or 60 diminished, as desired.

A wind-guard 24 may be placed at the top of the funnel 2 and adjacent to the thrashing cylinder, to direct the grain and straw into 65 the funnel-shaped receiver.

It will be clearly seen that with an apparatus of this character, arranged for utilizing

centrifugal force, a thorough and cleanly separation of grain from its straw can be readily and economically effected. The annular passages provided in the apparatus are of such 70 character and dimensions that they cannot possibly become choked and will at all times afford ready exit for the materials treated.

What I claim as my invention is—

1. In a grain separator, the combination of 75 a receiver open at both ends and adapted for reception of grain and straw from a thrashing cylinder, a rotary-drum communicating with and nearly surrounding said receiver 80 and having one end closed and the other end open, whereby an annular passage is provided between said communicating receiver and rotary-drum for the separation of grain by centrifugal force, a casing surrounding the rotary 85 drum at a distance, and a series of fans supported by and carried on the outside of the rotary-drum and in the annular passage between said drum and its casing, for the induction of upward drafts of air to drive off the 90 straw and chaff from the separated grain, substantially as described.

2. In a grain separator, the combination of a funnel shaped receiver for reception of grain and straw from a thrashing cylinder, a rotary- 95 drum communicating with and nearly surrounding the same to provide an annular passage for the separation of grain by centrifugal force, an inner casing surrounding the rotary-drum and forming an annular passage 100 therewith for the passage of an upward air draft, fans located in said annular passage and attached to and carried by the rotary-drum, an outer casing that forms with said inner casing an annular passage for descent 105 of grain thrown by centrifugal force from the top of the rotary-drum, and a series of fans arranged at the top of said outer annular passage and carried by the rotary-drum, substantially as described. 110

3. In a grain separator, the combination of a stationary funnel or receiver adapted for the separation of grain and straw from a thrashing cylinder, a rotary-drum open at the 115 top and having upward and outwardly flaring sides nearly surrounding said receiver, the said rotary-drum being provided with a closed bottom or lower end and supported below the said receiver and in communication with its lower end, fans carried on the outer 120 side of said rotary-drum, and inner and outer casings surrounding the drum and forming concentrically arranged annular passages, substantially as and for the purpose described. 125

4. In a grain separator, the combination with a thrashing cylinder, of a receiver located adjacent to said cylinder and adapted to receive grain and straw therefrom, a rotary 130 drum open at the top and having upward and outwardly flaring sides nearly surrounding said receiver and a closed lower end in communication with the lower end of the receiver, fans carried on the outer side of the



rotary drum, inner and outer casings surrounding the drum and forming concentrically arranged annular passages, and an annular horizontally arranged and vertically adjustable partition above the top of the outer annular passage, substantially as and for the purpose described.

5. In a grain separator, the combination with a thrashing cylinder, of a receiver located adjacent to said cylinder and adapted to receive grain and straw therefrom, a rotary drum open at the top and having a closed lower end in communication with the receiver and upward and outwardly flaring sides nearly surrounding said receiver, concentric annular passages surrounding the rotary drum, fans mounted upon the outside of the drum and within the inner one of said annular passages, and fans carried by said drum and arranged to operate above the outer annular passage, substantially as and for the purpose described.

6. In a grain separator, the combination with a thrashing cylinder, of a receiver for grain and straw from said cylinder, a rotary drum open at the top and having a closed lower end in communication with the receiver and provided with upwardly and outwardly flaring sides partly surrounding said receiver, concentric annular passages sur-

rounding the rotary-drum, fans mounted upon the outside of the drum and within the inner annular passage, fans carried by said drum and arranged to operate above the outer annular passage, and a tube for the delivery of chaff and straw from said fans to a wind stacker, substantially as described.

7. In a grain separator, the combination with a thrashing cylinder, of a receiver for grain and straw, a wind-guard at the top of said receiver, a rotary-drum open at the top and having upward and outwardly flaring sides partly surrounding said receiver, and a closed lower end in communication with the lower end of the receiver, inner and outer casings surrounding the drum and forming concentric annular passages, an annular partition adjustably supported above the top of the outer annular passage, fans carried by the rotary-drum for the delivery of chaff and straw above said partition, and a tube for conveying away the chaff and straw, substantially as described.

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

LYNNE W. MACOMBER,

Witnesses:

CHARLES E. THOMAS,  
ALFRED L. MARKOFF.