(No Model.) 2 Sheets—Sheet 1.

W. H. & J. BUTTERWORTH.

THRESHING MACHINE.

No. 574,303. Patented Dec. 29, 1896.

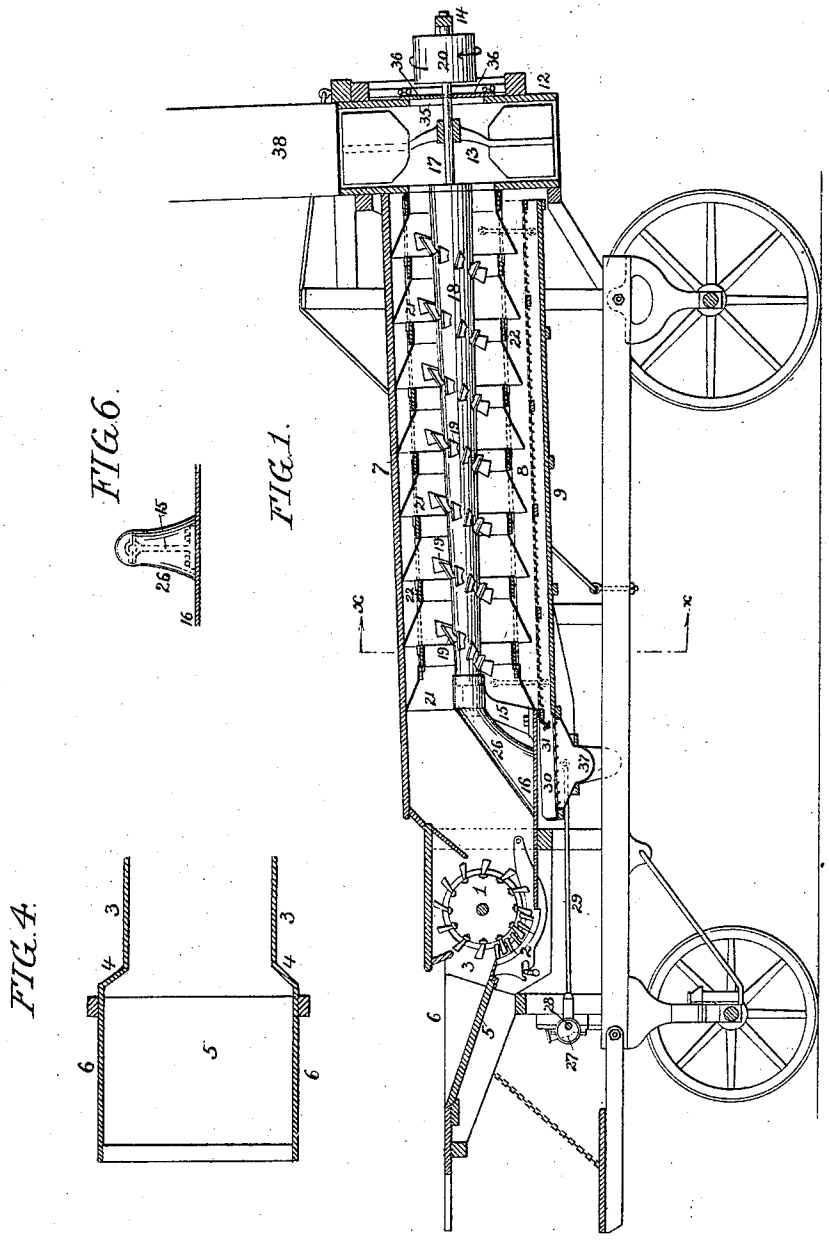

FIG. 1.

FIG. 6.

FIG. 4.

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(No Model.) 2 Sheets—Sheet 2.

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FIG. 2

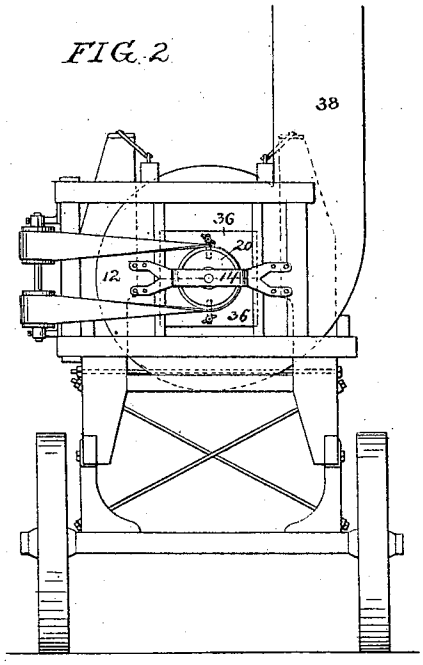


FIG. 3

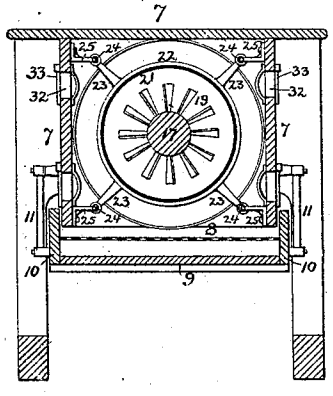
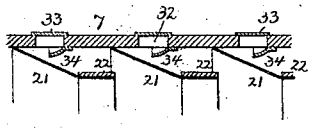


FIG. 5



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UNITED STATES PATENT OFFICE.

WILLIAM H. BUTTERWORTH AND JOHN BUTTERWORTH, OF TRENTON, NEW JERSEY.

THRESHING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 574,303, dated December 29, 1896.

Application filed August 19, 1895. Serial No. 559,778. (No model.)

To all whom it may concern:

Be it known that we, WILLIAM H. BUTTERWORTH and JOHN BUTTERWORTH, citizens of the United States, and residents of Trenton, New Jersey, have invented certain Improvements in Threshing-Machines, of which the following is a specification.

The object of our invention is to so construct a threshing-machine as to facilitate the feeding of the same, to increase the capacity of the machine, and to greatly lessen the number of parts in that portion of the machine known as the "conveyer and separator," and thereby to simplify and cheapen the construction of the machine, to enable it to be run with less power than usual, and to lessen its weight and thus permit it to be more easily transported. This object we attain in the manner hereinafter set forth, reference being had to the accompanying drawings, in which—

Figure 1 is a longitudinal section of sufficient of a threshing-machine to illustrate our present invention. Fig. 2 is a view looking at the rear end of the machine. Fig. 3 is a transverse section on the line *x x*, Fig. 1. Fig. 4 is a sectional plan view of part of the casing at the feed end of the machine. Fig. 5 is a longitudinal section of part of the machine on a somewhat larger scale than the other figures, and Fig. 6 is a front view of another part of the machine, also enlarged.

The cylinder 1 and concave 2 of the machine may be of any ordinary construction and are contained between the side plates 3 3, which are laterally expanded at 4 4, so as to increase the lateral width of the feed-table 5, which fits between the outer portion 6 of the side plates, as shown in Figs. 1 and 4, increased area being thus provided on the feed-table for the reception and spreading out of the grain to be threshed.

Both portions 3 and 6 of each side plate are vertical, so that the feed-table 5 is of the full area of the expanded portions of the side plates and can be adjusted vertically between them to accord with the adjustments of the concave, an object which cannot be attained when the side plates are flared or inclined in respect to the vertical, and by making all the side plates vertical a close fit is insured between the feed-table and the side plates in whatever position the said table is vertically adjusted.

In place of the usual conveying and separating devices beyond the cylinder and concave we use a trunk 7, which may be of any suitable form and dimensions, that form of trunk which we have shown and which we prefer being rectangular in cross-section and being open at the bottom, so as to discharge into a sieve 8, beneath which is a directing-plate 9, said sieve and directing-plate being carried by side bars 10, which are hung by means of links 11 to suitable studs on the sides of the trunk, so that the sieve and the directing-plate beneath the same can have a longitudinal shaking or vibrating motion imparted to them.

At the end of the trunk 7 is a fan-casing 12, containing a rotary fan 13, which is mounted upon a shaft 17, adapted to suitable bearings 14 and 15, the bearing 14 being supported upon the rear frame of the machine and the bearing 15 being mounted upon a base-plate 16, projecting into the forward end of the trunk 7. On the shaft 17 is a drum 18, which has a series of blades or projections 19 spirally or otherwise suitably arranged thereon, and the rear end of said shaft 17 is provided with a pulley 20 for the reception of a driving-belt, whereby the shaft with its fan and drum can be rapidly rotated in the direction of the arrow, Fig. 1.

Within the trunk 7 are a series of deflectors 21, each of which, as shown, is partly cylindrical and partly conical, although the deflectors may be wholly conical, if desired. These deflectors are so arranged that the contracted end of one is adjacent to the enlarged end of the next, so that an annular opening is formed around the contracted end of each deflector.

To the contracted end of each deflector is adapted a ring 22, and from each of these rings projects a series of arms 23, forming a bearing for the enlarged end of the adjoining deflector, the outer end of each arm being enlarged for the reception of a longitudinal bolt 24. These bolts are suitably supported by brackets 25 on the inside of the trunk and

are secured to the opposite end deflectors of the series, so as to unite the whole series firmly together.

A shield or deflector 26 covers and protects the front end of the rotating shaft 17 and drum 18 and its bearing, so as to prevent the straw from being caught by and wrapped around the front end of the rotating shaft.

The sieve-bars 10 are vibrated or reciprocated by means of eccentrics 27 on a transverse shaft 28 at the front end of the machine, said eccentrics acting through the medium of rods 29, and the front end of the directing-plate 9 terminates in a sieve 30. Both sieves 8 and 30 have downwardly-projecting barbs, formed by displacing the metal, in order to produce the openings in the sieves, the barbs of the sieve 30 extending in a direction the reverse of those of the sieve 8. Beneath the sieve 30 is a laterally-inclined spout 37, adapted to discharge the clean grain at one side of the machine.

At the front end of the chamber, between the sieve 8 and the directing-plate 9 beneath the same, is hung a valve 31, whereby the inflow of air to said chamber can be regulated, and in each side of the trunk 7 are formed openings 32, the area of which can be readily regulated by swinging valves 33, so as to regulate the inflow of air into the trunk around the deflectors 21, the rear side of each of these openings 32 being provided with a segmental shield 34, Fig. 5, so as to prevent the escape through the opening of any grain, chaff, or other small particles thrown forward by the deflectors.

In the rear of the fan-casing 12 is an opening 35, the area of which can be regulated by sliding valve-plates 36, so as to permit a flow of air into the fan through the opening 35 in any desired volume.

The operation of the machine is as follows: The unthreshed straw is first spread evenly and thinly on the surface of the feed-table 5, and is thence fed forward by the operator into the cylinder and concave, whereby the threshing operation is effected and the grain, mingled with straw and chaff, is thrown into the front end of the trunk 7. The valve-plates 36 have previously been adjusted so as to cause the fan to draw a current of air with any desired degree of force through the series of deflectors 21 within the trunk and also through the side openings 32 of the same and through the space beneath the screen 8, the volume of air admitted to said openings and into said space being regulated by the adjustment of the valves 33 and 31, respectively. The grain, straw, and chaff are thus drawn forward into the series of deflectors and comes under the action of the blades or teeth of the rapidly-rotating drum 18, whereby all of the particles are thrown outward against the inclined surfaces of the deflectors. The grain being the heaviest is thrown forwardly by the conical portion of each deflector into the annular space surrounding the deflector in advance of it, and thence drops onto the sieve 8. A large portion of the straw and chaff are removed by the current passing rearwardly through the deflectors 21, there being a still further separation in the chambers surrounding each deflector by reason of the air-current entering the openings 32, the matters thus separated being drawn rearward into and through the following deflector. Chaff and small particles of straw are also separated from the grain while the latter is upon the sieve 8 or is passing through the openings of the same or traveling forwardly along the director-plate 9, and a final separation is effected upon the sieve 30 and in the discharge-spout 37 beneath the same. All of the separated matters are drawn into the fan-casing 12, and are discharged by the fan through the vertical spout 38 onto a suitable stack.

The deflectors 21 constitute in effect a tubular conveyer which receives at the front end the material to be separated, the travel of the material from the front to the rear end of this conveyer being effected in part by the draft of the discharge-fan at the rear end of the same and in part by the action of the spirally-arranged blades or beaters on the drum 18.

The conical deflectors serve to direct to the outside of the conveyer any heavy particles which may be thrown against them by the vanes or beaters of the drum, thereby separating such particles from the straw and light chaff. Hence the device constitutes a cheap, light, convenient, and effective substitute for the ordinary conveyers and separators of a threshing-machine, the size and weight of the machine being materially decreased, its transportation facilitated, and a material saving of power in the operation of the machine effected.

Having thus described our invention, we claim and desire to secure by Letters Patent—

1. A threshing-machine having a cylinder, a concave and a feed-board adjustable vertically with the concave, in combination with side plates inclosing the cylinder, concave and feed-board, those portions of the side plates which inclose the feed-board being separated more widely than those which inclose the concave, and being united thereto by flaring connections, all portions of the side plates, however, being vertical, substantially as specified.

2. The combination in a threshing-machine, of the threshing mechanism, a tubular conveyer leading rearwardly therefrom, and a discharge-fan at the rear or delivery end of the conveyer, the casing of the conveyer presenting a series of inclined deflectors with discharge-openings adjacent thereto whereby particles such as grain thrown against the conveyer-casing from the inside will be directed by said deflectors to the outside of the conveyer, substantially as specified.

3. The combination in a threshing-machine, of the threshing mechanism, a tubular conveyer leading rearwardly therefrom, and means within said conveyer for throwing the

material as it passes through the conveyer outwardly against the sides of the same, said conveyer presenting a series of deflectors with discharge-openings adjacent thereto, whereby particles such as grain thus thrown out against them will be directed to the outside of the conveyer, substantially as specified.

4. The combination in a threshing-machine, of the threshing mechanism, a tubular conveyer leading rearwardly therefrom, a discharge-fan at the rear end of said tubular conveyer, and means within the conveyer for throwing outwardly against the inside of the conveyer material passing through the same, said conveyer presenting a series of inclined deflectors with discharge-openings adjacent thereto, whereby material thrown against the deflectors will be directed to the outside of the conveyer, substantially as specified.

5. The combination in a threshing-machine, of the threshing mechanism, a tubular conveyer extending rearwardly therefrom, and presenting a series of inclined deflectors with discharge-openings adjacent thereto, means for causing material delivered by the threshing-machine to pass through said tubular conveyer and for throwing said material outwardly against the inside of the conveyer, whereby particles such as grain will be directed by the deflectors to the outside of the conveyer, and a trunk or casing inclosing said conveyer, substantially as specified.

6. The combination in a threshing-machine, of the threshing mechanism, a tubular conveyer extending rearwardly therefrom and presenting inclined deflectors with discharge-openings adjacent thereto, means for causing material delivered by the threshing-machine to pass through said conveyer and to be thrown outward against the inside of the same, whereby particles such as grain will be directed by the inclined deflectors to the outside of the conveyer, a trunk or casing inclosing said conveyer, and a sieve in the lower portion of said trunk or casing adapted to receive the material thrown to the outside of the conveyer, substantially as specified.

7. The combination in a threshing-machine, of the threshing mechanism, a tubular deflector extending rearwardly therefrom and presenting a series of inclined deflectors with discharge-openings adjacent thereto, a trunk or casing inclosing said conveyer and forming a series of chambers for receiving the discharge from each of the openings of the same, means for providing a regulated flow of air into said chambers, a discharge-fan at the rear or delivery end of the conveyer, and means whereby the material passing through the conveyer is thrown outward against the inside of the same whereby particles such as grain are directed by the inclined deflectors to the outside of the conveyer against the currents of air passing into the conveyer through the grain-discharge openings, substantially as specified.

8. The combination in a threshing-machine, of the threshing mechanism, a tubular conveyer extending rearwardly therefrom and composed of a series of flaring deflectors disposed so that the contracted end of one is adjacent to the flaring end of the next, whereby each deflector is adapted to direct to the outside of the next deflector particles such as grain thrown against it from the inside of the conveyer, and means for causing material from the threshing-machine to pass through the conveyer and to be thrown outwardly against the deflectors, substantially as specified.

9. The combination in a threshing-machine, of the threshing mechanism, a tubular conveyer extending rearwardly therefrom and consisting of a series of inclined deflectors disposed so that the contracted end of one is adjacent to the expanded end of the next, spiders mounted upon the contracted end of each deflector and constituting an end bearing for the expanded end of the adjoining deflector, longitudinal bolts for retaining the deflectors in contact with said spiders, and means for causing the material from the threshing-machine to pass through the conveyer and to be thrown outwardly against the deflectors constituting the same, substantially as specified.

10. The combination in a threshing-machine of the threshing mechanism, a tubular conveyer extending rearwardly therefrom and presenting a series of inclined deflectors with discharge-openings adjacent thereto, whereby particles such as grain thrown outwardly against said deflectors will be directed thereby to the outside of the conveyer, a shaft extending through the conveyer and having beaters thereon, said shaft being located above the bottom of the threshing-cylinder, a bearing for the front end of said shaft, and a deflecting-shield covering the end of the shaft and its bearing whereby the material thrown into the front end of the conveyer by the threshing-machine will be prevented from striking the end of said shaft and its bearing, substantially as specified.

In testimony whereof we have signed our names to this specification in the presence of two subscribing witnesses.

WILLIAM H. BUTTERWORTH.
JOHN BUTTERWORTH.

Witnesses:
GEO. F. SCHULE,
W. K. BOWNE.