

No. 654,192.

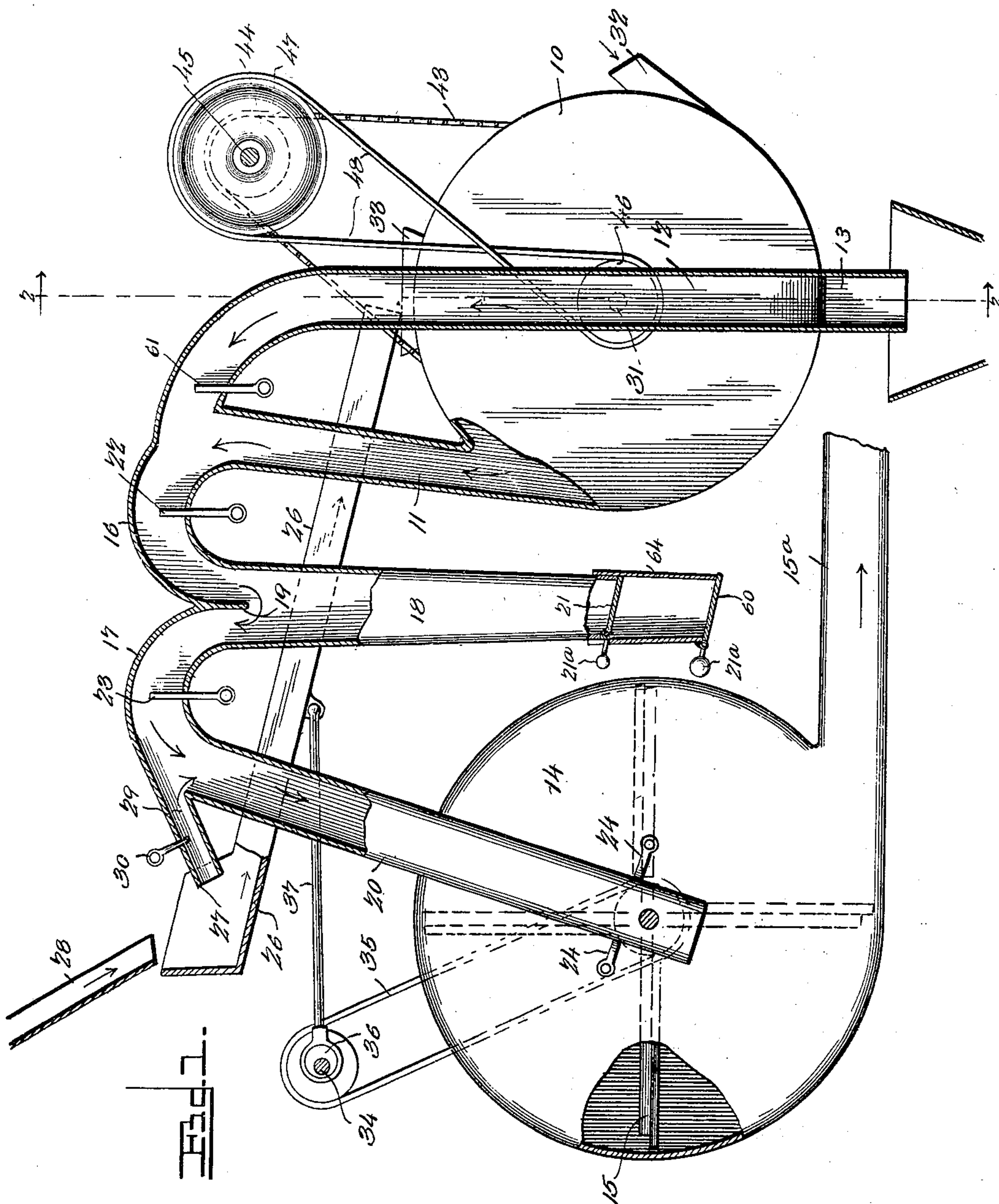
Patented July 24, 1900.

J. L. TOLIVER.  
GRAIN SCOURER.

(Application filed Nov. 17, 1899.)

(No Model.)

4 Sheets—Sheet 1.



Witnesses

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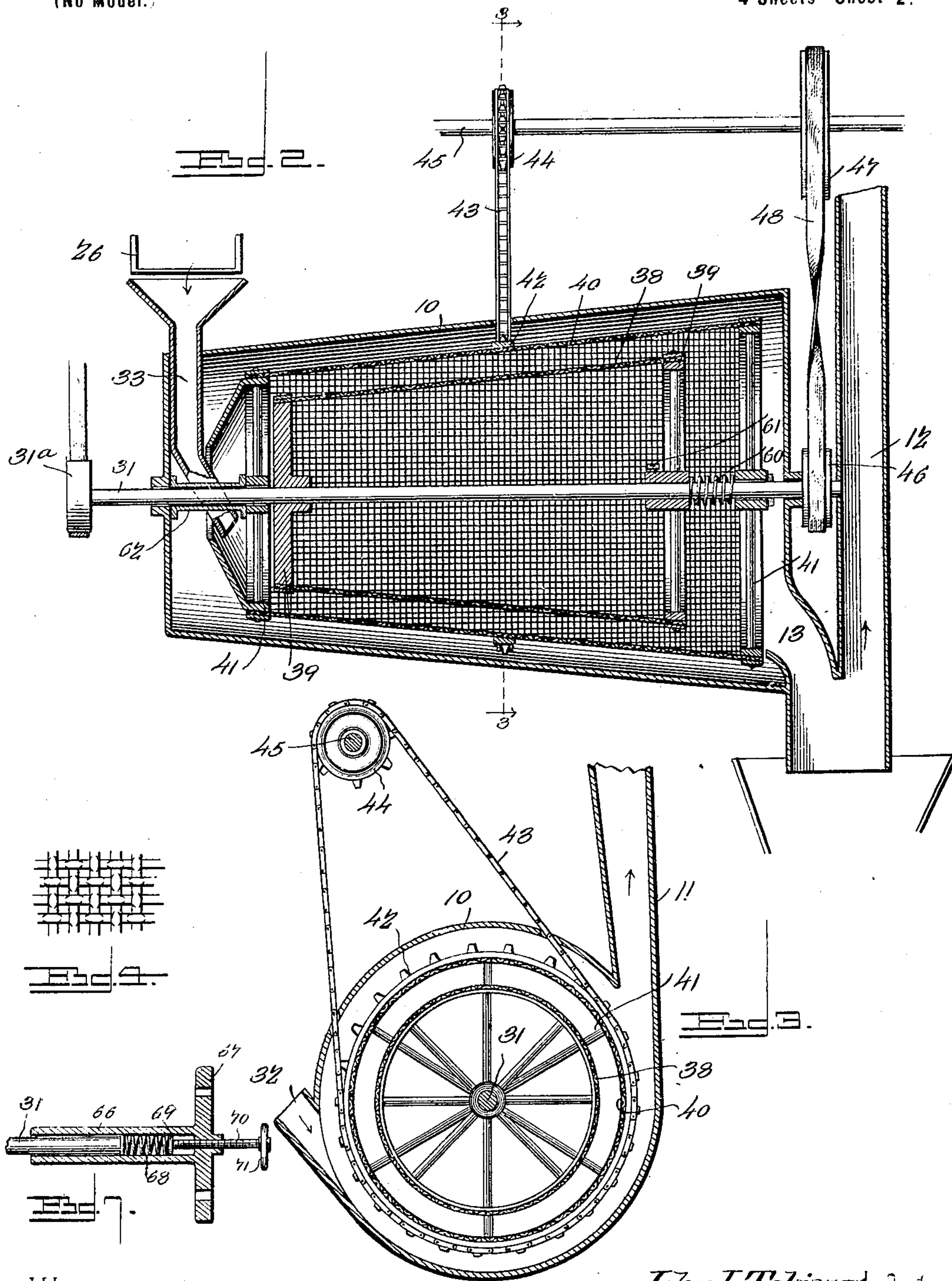
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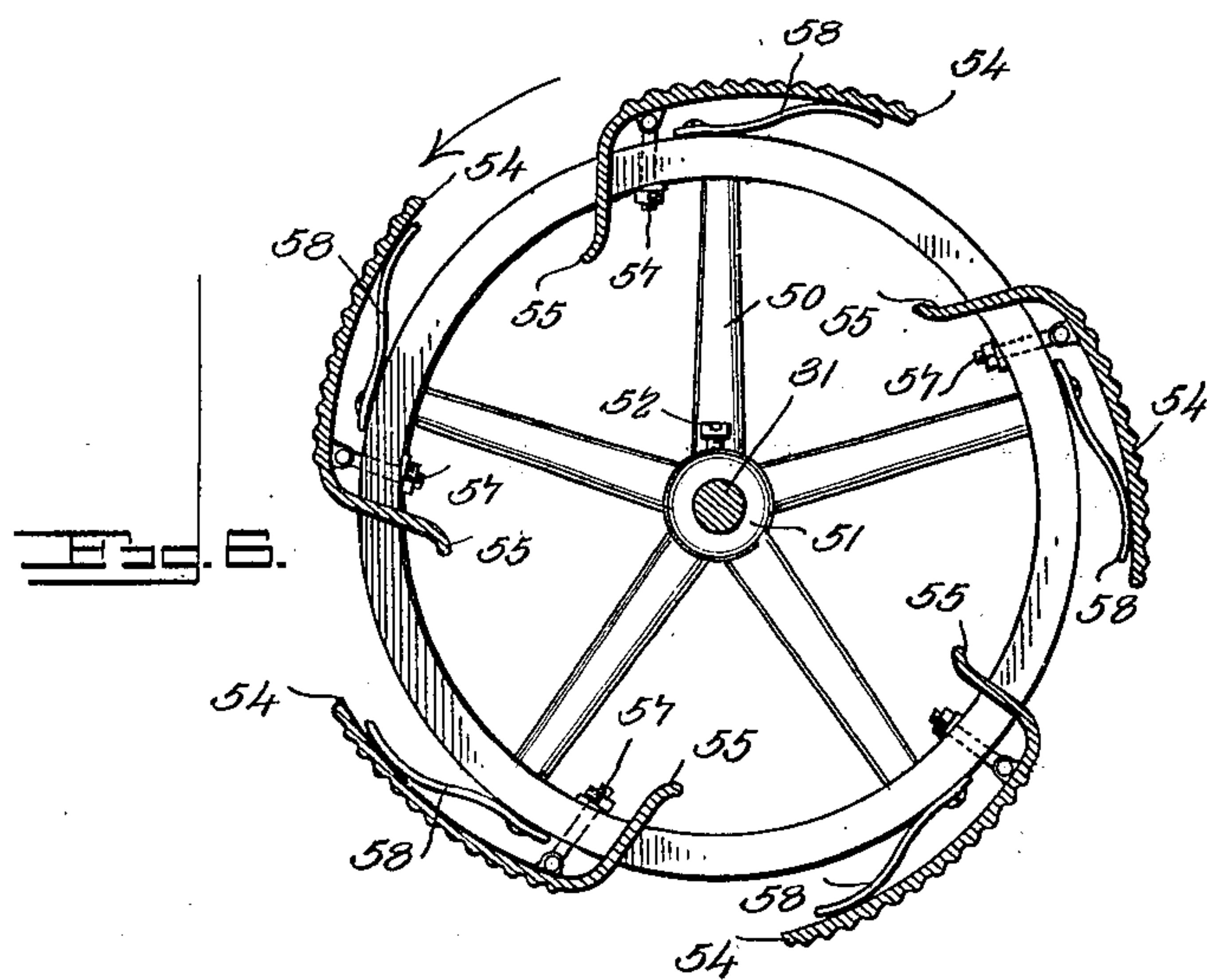
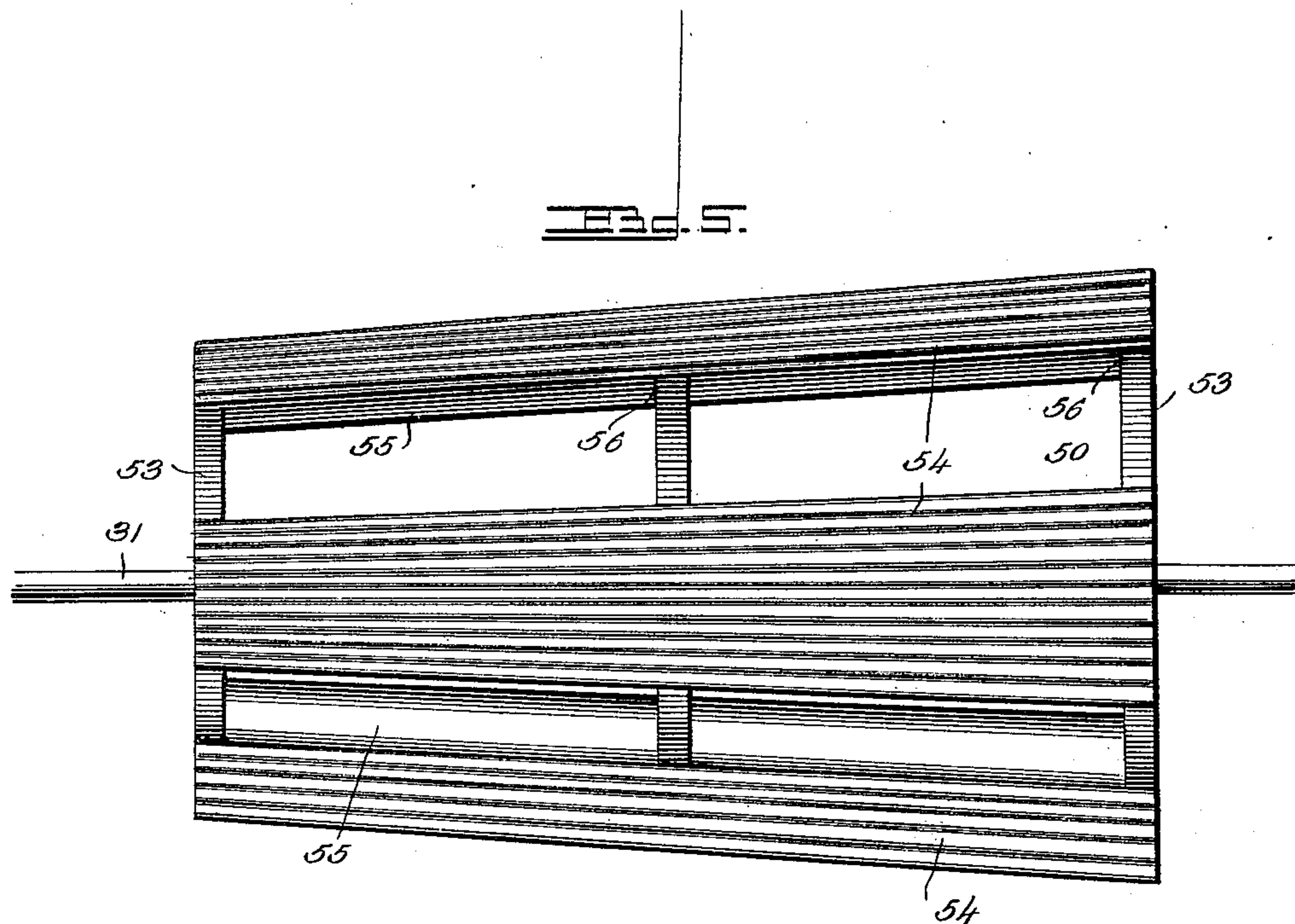
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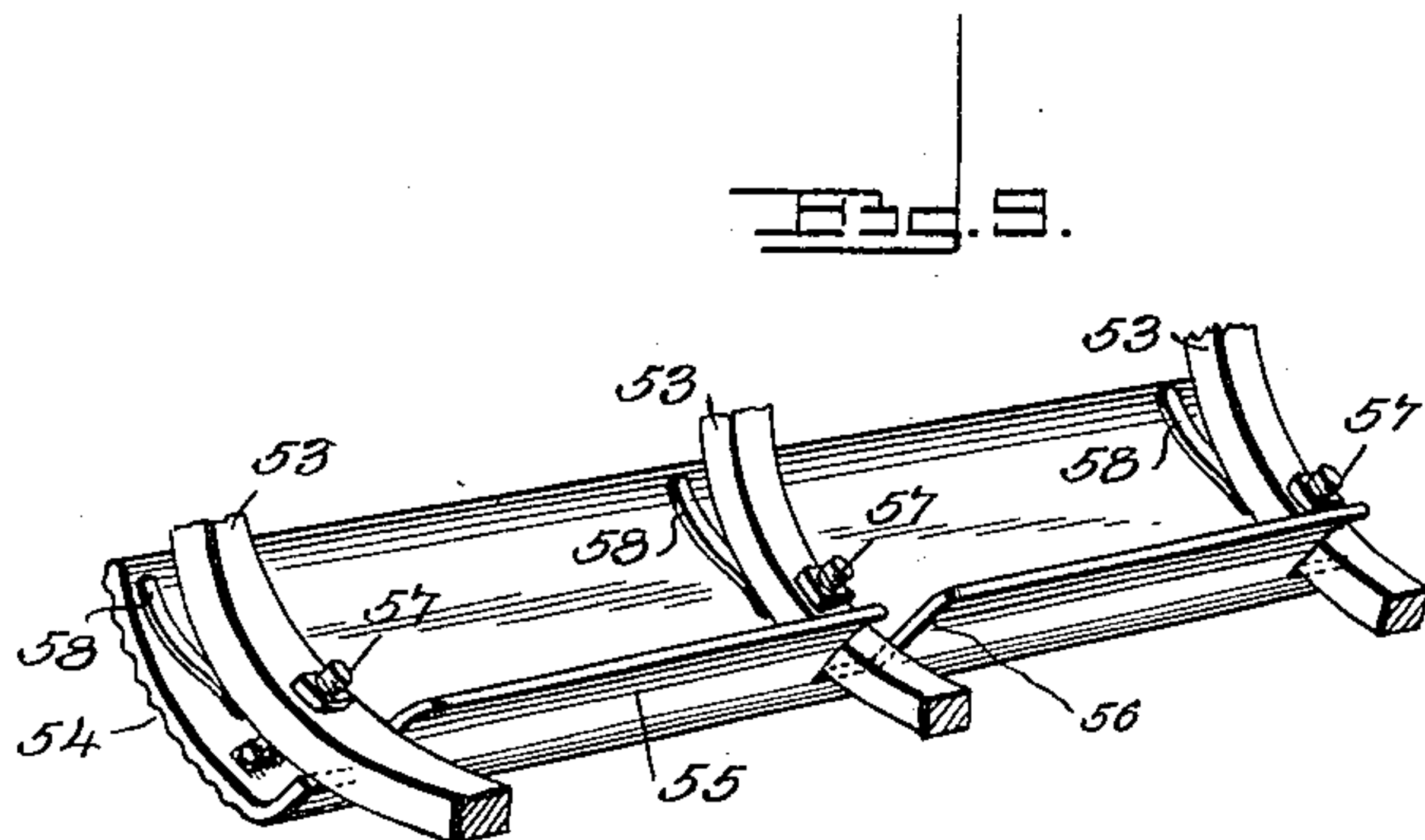
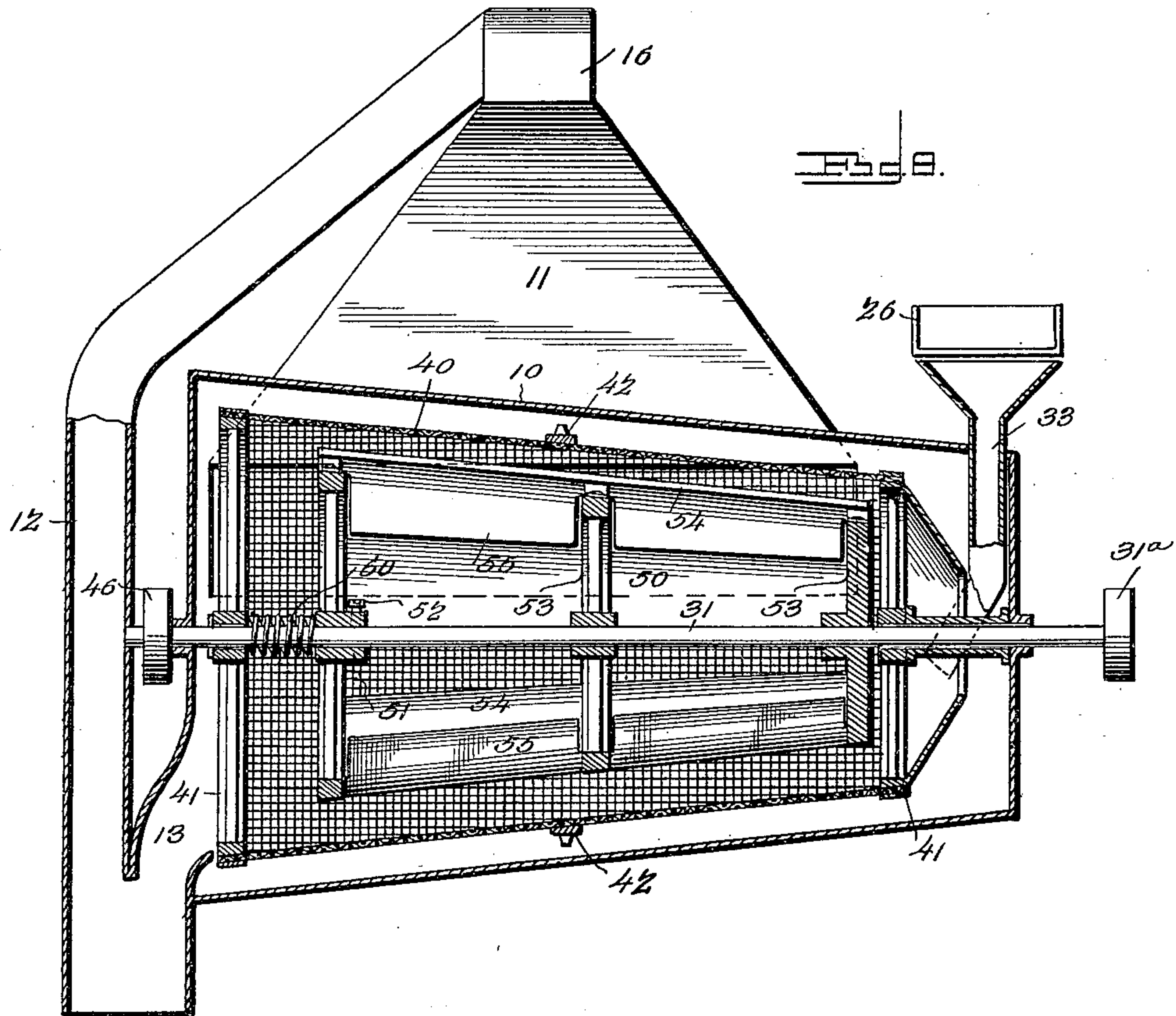
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4 Sheets—Sheet 4.



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# UNITED STATES PATENT OFFICE.

JOHN L. TOLIVER, OF CORTNER, TENNESSEE.

## GRAIN-SCOURER.

SPECIFICATION forming part of Letters Patent No. 654,192, dated July 24, 1900.

Application filed November 17, 1899. Serial No. 737,348. (No model.)

*To all whom it may concern:*

Be it known that I, JOHN L. TOLIVER, a citizen of the United States, residing at Cortner, in the county of Bedford and State of Tennessee, have invented a new and useful Grain-Scourer, of which the following is a specification.

My invention relates to improvements in grain scourers and cleaners; and one object in view is to provide an improved construction by which the wheat is rubbed frictionally in its passage through the machine to eliminate the smut and like refuse therefrom without involving injury to the surface of the wheat.

A further object is to provide means for carrying off the smut and refuse and to separate the cheat, oats, and light grain from the good grain by the action of an air current, the pneumatic separating devices being arranged to separately carry off the dust and light refuse from the cheat, oats, and light grain, so that the latter may be sacked separately from the discharge of the good grain.

A further object is to provide an improved scouring mechanism constructed to forcibly rub the grain under yielding pressure and to feed the grain through the cylinder.

With these ends in view the invention consists in the novel combination, construction, and arrangement of parts, which will be hereinafter fully described and claimed.

In the drawings, Figure 1 is an end elevation of a grain-scourer embodying my invention. Fig. 2 is a longitudinal sectional view taken through the machine in the plane of the dotted line 2 2 of Fig. 1. Fig. 3 is a cross-section through the machine in the plane of the dotted line 3 3 of Fig. 2. Fig. 4 is a detail view of the metallic fabric which I may employ in the construction of the cylinders. Fig. 5 is a side elevation of another embodiment of the internal scouring-cylinder which I prefer to employ within the outer scouring-cylinder, and Fig. 6 is a transverse section of the scouring-cylinder shown by Fig. 5. Fig. 7 is a detail sectional view of the preferred means for giving the endwise adjustment to the reel-shaft in order to regulate the grain-space between the two conical cylinders. Fig. 8 is a longitudinal sectional view. Fig. 9 is

a detail perspective view of a portion of the scouring-cylinder.

The same numerals of reference are used to indicate like and corresponding parts in each of the several figures of the drawings.

10 designates the casing within which is housed or contained the scouring mechanism which I have invented for mechanically and frictionally rubbing wheat for the elimination of smut, fuzz, and other refuse adhering to the surface of the grain. In connection with the casing I employ a primary wind-trunk 11 and an auxiliary wind-trunk 12, both of which communicate through intermediate devices with the casing of a suction-fan. The casing 10 is of conical cylindrical formation, and at its larger end it is provided with a grain-outlet 13. The primary suction-trunk 11 is equal in width to the length of the casing and is coupled or united to the upper side of the casing, so as to draw in a current of air along the full length of the scouring-cylinders, whereby the mechanism operates efficiently to carry off all the smut, fuzz, and light refuse which may be removed from the grain. The casing 14 contains a rotary fan 15, and from this fan-casing extends a discharge branch 15<sup>a</sup>, adapted to carry the smut, dust, and other impurities to a suitable place of discharge. The auxiliary wind-trunk 12 is erected in a vertical position for its lower open end to terminate adjacent to the grain-outlet 13 from the cylinder-casing 10, and the upper part of this trunk 12 is reduced in width and is coupled to the corresponding upper part of the primary suction-trunk 11. The last-named suction-trunk enlarges from its union with the casing 10 to the point where the suction-trunk 12 is united thereto, and from this primary suction-trunk extends a curved elbow 16. Another curved elbow 17 is adjacent to the elbow 16 and it communicates with a connecting-leg 20, which leads to the eye of the fan-casing 14. A depending-leg 18 is joined to the curved elbows 16 17, so as to lie between the wind-trunk 11 and the leg 20, and between the two elbows is a deflector 19, which extends into the depending leg 18 and is formed practically by the meeting or abutting top sides of the elbows. A controlling-valve 21 is provided in the



lower extremity of the depending leg, and a sack or bag (not shown) is adapted to be connected to this leg for the purpose of receiving the cheat, oats, and light grain which may be discharged through the leg. Other controlling-valves 22 23 61 are provided in the elbows, and valves 24 are provided in the fan-casing or the connecting-leg 20 for the purpose of controlling the air-current. The rotation of the exhaust or suction fan 15 creates a strong current of air through the wind-trunk 11 and forces a blast through the discharge-pipe 15<sup>a</sup>, an upwardly-moving current of air being set up siphonically in the auxiliary wind-trunk 12, which communicates with the grain-discharge 13. The current of the auxiliary wind-trunk, while not so strong as the current through the trunk 11, is of sufficient strength to lift and carry off the cheat, oats, and light grain, while the good grain is discharged from the outlet 13, and the current from the trunk 12 may mingle or combine with the current from the trunk 11, so that the substances suspended mechanically in the current of the trunk 12 will be carried over the trunk 11 and into the elbow 16. The grain discharged through the outlet 13 is met by the ascending current of air at the intake of the auxiliary wind-trunk 12, which serves to finally winnow the grain discharged from the screening and scouring mechanism. The current from the two wind-trunks carries the screenings through the elbow, so that the air-current must pass or dip below the deflector, and this feature is important in my apparatus, because the cheat, oats, and light grain, forming a proportion of the screenings, are caused to impinge against the deflector and to drop by gravity through the leg 18, so as to accumulate in a sack or receptacle suspended therefrom, while at the same time the air-current carries the refuse of the screenings—such as the smut, fuzz, dust, and dirt—through the elbow 17 and the leg 20 into the fan-casing, from which the refuse is blown through the branch or discharge flue 15<sup>a</sup>.

26 designates a shaking riddle which is suspended by any suitable means above the cylinder-casing 10. This riddle is arranged in an inclined position, so as to discharge the grain delivered thereto by the chute 28 toward the receiving end of the casing 10. The head or upper end of this riddle is disposed under a suction-spout 27, which is connected at 29 with the elbow 17 at the upper extremity of the connecting-leg 20, said connection 29 having a suitable valve 30, whereby the light refuse and chaff are drawn from the riddle at the time the grain is deposited thereon by the chute 28, thus cleansing the grain preliminary to its feed into the scouring mechanism.

31 designates the cylinder-shaft, which extends longitudinally and centrally through the conicocylindrical casing 10, said shaft being journaled in suitable bearings and adapted to carry or support the two cylinders

which constitute the scouring mechanism that is housed or contained within the casing 10. Said casing is provided at its enlarged end with an air-inlet 32, and into the other smaller end of the casing extends an upright feed-spout 33, the latter arranged for its upper end to lie below the delivery end of the shaking riddle for the purpose of transferring the grain from the riddle to the space between the cylinders of the scouring mechanism.

I prefer to impart the shaking motion to the riddle through an intermediate shaft 34, the latter being journaled in suitable bearings adjacent to the head of the riddle. The shaft is provided with a sprocket-gear or a band-pulley to receive a sprocket chain or belt 35, the latter extending around another sprocket-gear or band-pulley on the fan-shaft 15, whereby the intermediate shaft is driven by the fan-shaft. This shaft 34 is also provided with an eccentric 36, adapted to drive a pitman 37, having pivotal connection with the frame of the shaking riddle.

38 designates the inner scouring-cylinder, which is provided at its ends with the heads 39, that are made fast with the cylinder-shaft 31. The outer scouring-cylinder 40 surrounds the inner cylinder, and it is supported by the spiders 41, which are mounted loosely on the shaft, so that the outer cylinder may turn independently of the shaft of the inner cylinder, whereby the shaft serves to support both cylinders, and the latter are arranged for the outer cylinder to rotate in an opposite direction to the inner cylinder. These cylinders are preferably tapered longitudinally, so as to present a conicocylindrical appearance, and between the eccentrically-arranged cylinders is an intermediate space, into which the grain is delivered at the smaller receiving end of the scouring mechanism by the feed-spout 33. Each cylinder may consist of a wire fabric of the character shown by Fig. 5 of the drawings, wherein the warp and the woof wires are bent to embrace one another quite closely together and are provided with flattened faces, which are opposed and constitute efficient working surfaces for scouring the grain without injury thereto; but I do not desire to confine myself to the employment of this particular fabric in the construction of the cylinders, because I am aware that slotted or perforated sheet metal may be employed. The cylinder-shaft 31 is provided at one end with a band-pulley or sprocket-wheel 31<sup>a</sup>, adapted for the reception of a driving-belt or a sprocket-chain. An annular band 42 is secured centrally around the outer cylinder 40, opposite the central spider thereof, and this band is provided with sprocket-teeth, which are engaged by a sprocket-chain 43, the latter having engagement with the sprocket-wheel 44 on an elevated counter-shaft 45. This counter-shaft is driven from and in an opposite direction to the cylinder-shaft 31 through the band-pulleys 46 47 and the crossed belt 48, said band-pulleys being secured respectively to



the cylinder-shaft and the counter-shaft. The employment of the belt 48 enables the rotation of the outer cylinder to be quickly arrested by slipping the belt off the pulleys in the event of lodgment of a substance or object in the space between the two cylinders which would tend to obstruct the opposite rotation of the cylinders and clogging of the grain-space therebetween. In the embodiment of the invention represented by Figs. 5 and 6 of the drawings I employ an inner cylinder within the outer scouring-cylinder, adapted to forcibly press the grain into contact with the outer cylinder and frictionally remove smut, fuzz, and other adhering matter therefrom. In this embodiment of the invention I employ a series of spiders 50, preferably three in number and having their hubs 51 made fast with the shaft 31 by the set-screws 52. These spiders gradually increase in diameter from one end of the cylinder to the other, and, as shown, each spider consists of a hub 51, a series of radial spokes, and the rim 53, all of which are cast in a single piece. The series of spiders carry or support a plurality of movable blades 54, which are arranged circumferentially outside of the rims and are spaced or separated at their contiguous edges, as shown by Fig. 6. Each blade tapers in width from the receiving smaller end of the cylinder toward the large end thereof, and the working surface of the blade is corrugated or roughened by forming rasp-like teeth on the outer face opposed to the outer cylinder. The blade is furthermore provided with a bent or curved arm 55, which may be extended inwardly within the circular plane of the spider-rims, said arm being notched at 56 to enable it to fit the rims. The blades are furthermore held loosely on the spiders through the medium of the bolts 57, which are connected with the spiders and the blades close to the points where the arms 55 of the blades embrace the rims of the spiders. This method of fitting and attaching the longitudinal blades to the spiders provides for a limited movement of the blades outwardly toward the surrounding scouring-cylinder, and said blades are pressed normally toward this cylinder by suitable pressure devices, which in the form shown consist of bent or spiral springs 58, which are seated on the spiders and act against the inner surfaces of the blades. It is evident, however, that other types of pressure devices may be resorted to, such as rubber blocks or equivalent means.

The longitudinally-disposed blades are yieldably pressed toward the outer scouring-cylinder by the springs or equivalent devices, and these blades serve to frictionally rub the grain between the outer cylinder and the roughened working surfaces of the blades themselves. The inclination of the cylinders due to the cone-shaped formation thereof tends to feed the grain by gravity through the annular space between the cylinders, and in the construction shown by Figs. 5 and 6 the

taper given to the blades consists in the feeding action of the grain lengthwise of the cylinder, whereby the grain is treated or rubbed and advanced through the cylinder, so as to thoroughly remove the smut, fuzz, and other objectionable matter therefrom. During this period of mechanically rubbing the grain as it passes between the scouring-cylinders the suction-current is created through the trunks 11 12 and the cylinder-casing, so that the air is violently agitated in the casing for the purpose of drawing the smut and dirt from the grain and the cylinders. The suction-current through the trunk 12 carries out the cheat, oats, and light grain discharged from the outlet 13 along with the good grain, and thus the smut, dirt, and undesirable grain are conveyed away from the casing through the trunks 11 12 and into the elbow 16. The solid particles in the suction-current impinge against the deflector in order to drop through the leg 18, while the dust and lighter particles of refuse are carried by the current through the elbow 17 and leg 20 into the fan, from which they are discharged with the blast through the discharge branch 15<sup>a</sup>.

It is evident that the inner cylinder (shown by Figs. 5 and 6) may be rotated in an opposite direction to the outer cylinder, because the inner cylinder is carried directly by the shaft, while the outer cylinder may be driven from the counter-shaft.

Changes within the scope of the appended claims may be made in the form and proportion of some of the parts, while their essential features are retained and the spirit of the invention embodied. Hence I do not desire to be limited to the precise form of all the parts as shown, reserving the right to vary therefrom.

In the construction shown by Fig. 2 the inner scouring-cylinder is adapted to be moved longitudinally a limited distance with relation to the outer scouring-cylinder for the purpose of varying the cross-sectional area of the space between the two cylinders. The hub of the spider at the large end of the inner scouring-cylinder is acted on by a coiled spring 60, and said spider-hub is provided with a set-screw 61, which may be operated to clamp the spider at a given position on the shaft. I prefer, however, to employ the construction shown by Fig. 7 for the purpose of giving the endwise adjustment to the shaft 31, because such construction permits the shaft to be adjusted while it is rotated and the machine is in motion. The end of the reel-shaft 31 is fitted loosely in an elongated sleeve-bearing 66, which bearing is made fast with or an integral part of a supporting plate or bracket 67, which bracket is adapted to be fastened firmly to any suitable part of the apparatus. A coiled spring 68 is fitted loosely within the sleeve-bearing 66, in a position to engage with one end of the shaft 31, either directly or through an intermediate washer, and against the other end of this



coiled spring bears a washer 69. An adjusting-screw 70 is arranged in axial alinement with the sleeve-bearing and the shaft, so as to work in a threaded opening provided in the bracket of the plate 67, and this adjusting-screw is equipped with an external hand-wheel 71 for the purpose of conveniently rotating the screw so as to compress the spring and impart the endwise movement to the reel-shaft when the screw is turning in one direction. A reverse adjustment of the screw permits the spring to expand, and thus decrease the tension exerted thereby on the shaft, whereby the grain between the two cylinders is adapted to press the inner cylinder and the shaft lengthwise.

The discharge-leg 18 of my apparatus is arranged, preferably, in a position inclined to the vertical plane of the legs 11 20, and I prefer to connect or attach a spout 64 in any suitable way to the lower end of the leg. The valve 21 in the lower extremity of the leg 18 is counterpoised—as, for example, by the weight 21<sup>a</sup>—so as to open under the weight of a certain quantity of grain in order to discharge the latter into the chamber of the spout 64. This spout 64 is equipped with a counterpoised valve 60, adapted to remain closed when the valve 21 is opened, so as to exclude the admission of air to the leg 18 on the opening of said valve; but when the volume of grain that accumulates in the spout 64 is sufficient to overcome the resistance of the counterpoise this valve is also operated automatically for the purpose of discharging the grain from the apparatus.

In Fig. 2 of the drawings I have shown a sleeve or collar 62 to limit the movement in

one direction of the outer cylinder on the reel-shaft, said sleeve being shown as engaging with one of the reel-heads 41 and an end wall of the casing 10.

Having thus described the invention, what I claim is—

1. In a grain scourer and cleaner, the casing 10 having the air-inlet opening on one side, the wind-trunk 11 leading from the opposite side thereof, the auxiliary wind-trunk 12, connected to wind-trunk 11 and having its intake communicating with the discharge end of the casing, a fan-casing, a wind-trunk leading therefrom to the wind-trunk 11 and having a depending discharge-leg 18, a baffle being formed at the upper end thereof in said wind-trunk, and the same also having the suction-spout 27, in combination with the riddle 26 and the scouring and cleaning mechanism in the casing 10, substantially as described.

2. The inner scouring-cylinder comprising the shaft, the spiders thereon having the rims, the rubbing-blades pivotally connected to the rims of the spiders and having the inwardly-extending arm portions notched to receive the rims of the spiders, and the springs attached to the said rims and bearing outward against said rubbing-blades, 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.

JOHN L. TOLIVER.

Witnesses:

E. R. BRANDON,  
A. G. LANDESS.