

No. 806,055.

PATENTED NOV. 28, 1905.

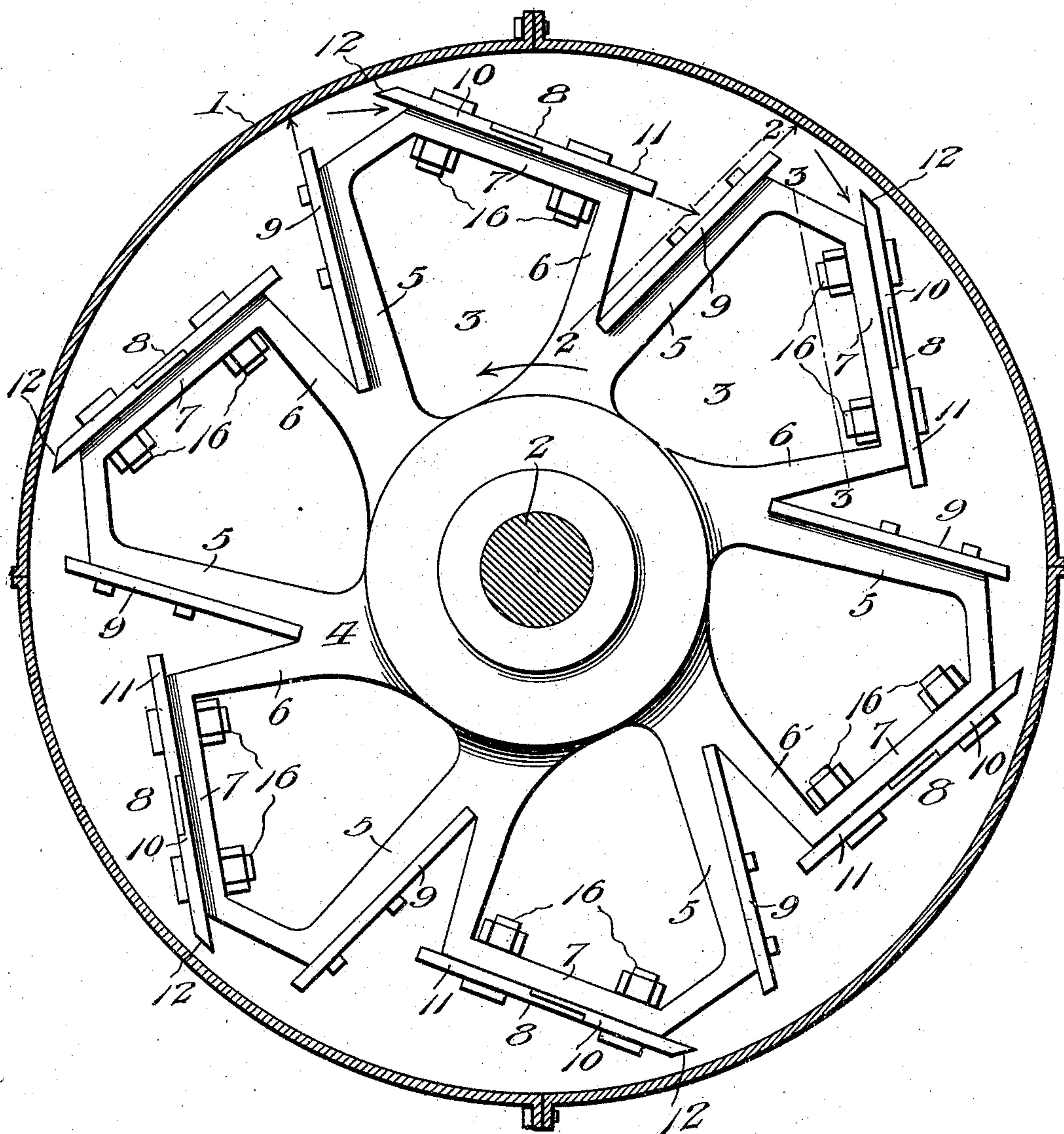
W. C. BRENNER.

GRAIN SCOURER.

APPLICATION FILED MAR. 16, 1904.

2 SHEETS—SHEET 1.

*Fig. 1.*



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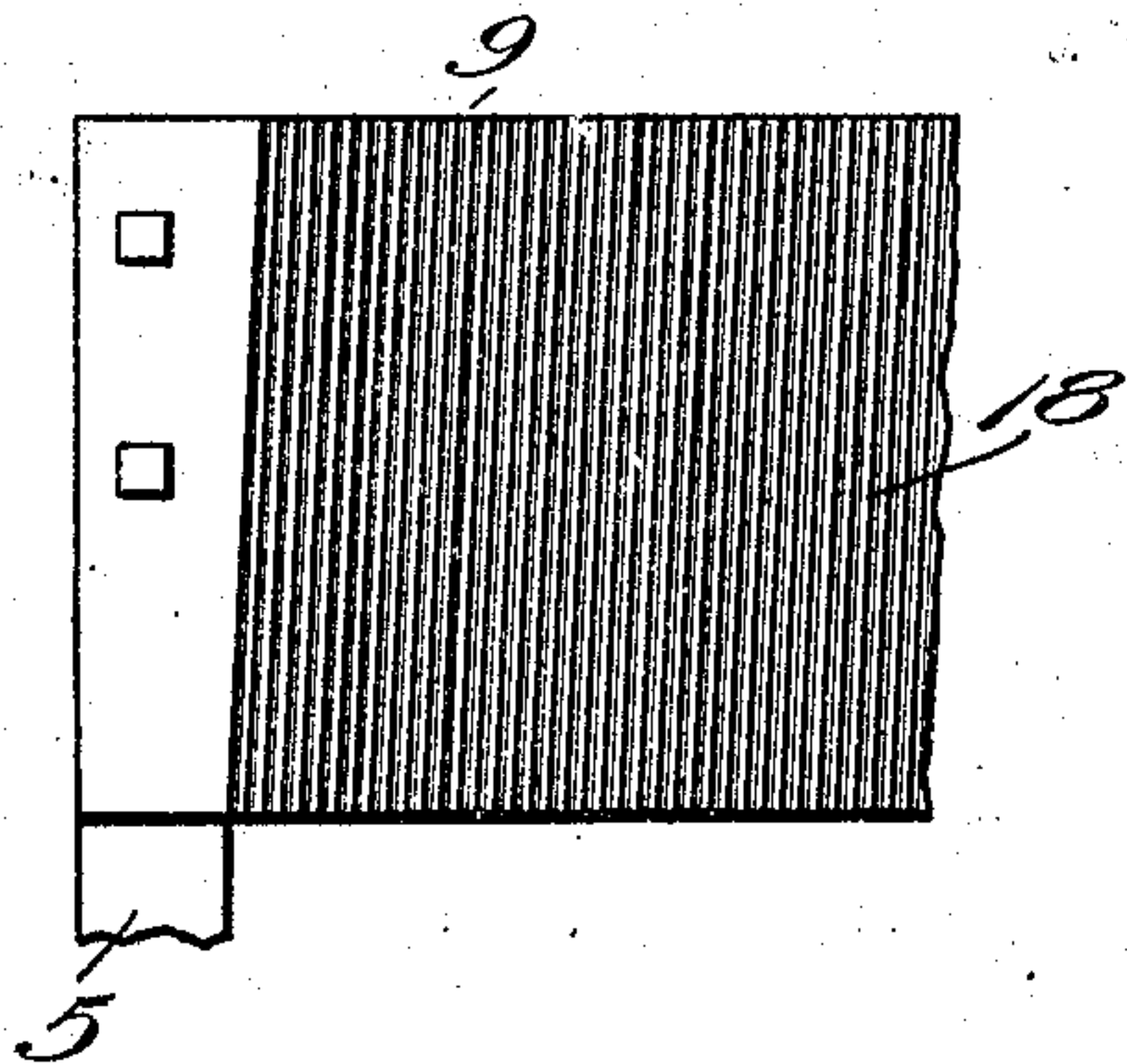
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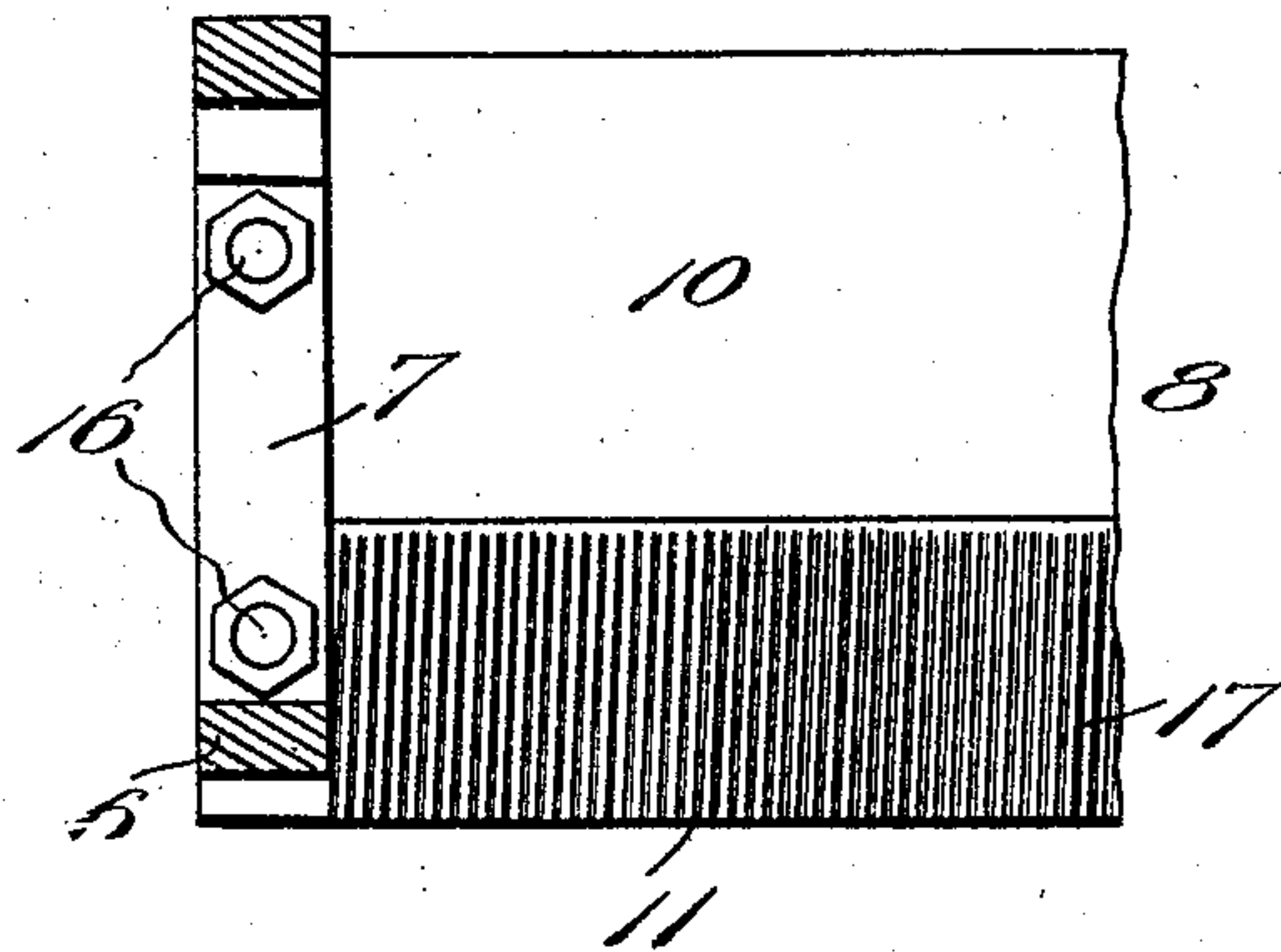
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2 SHEETS—SHEET 2.

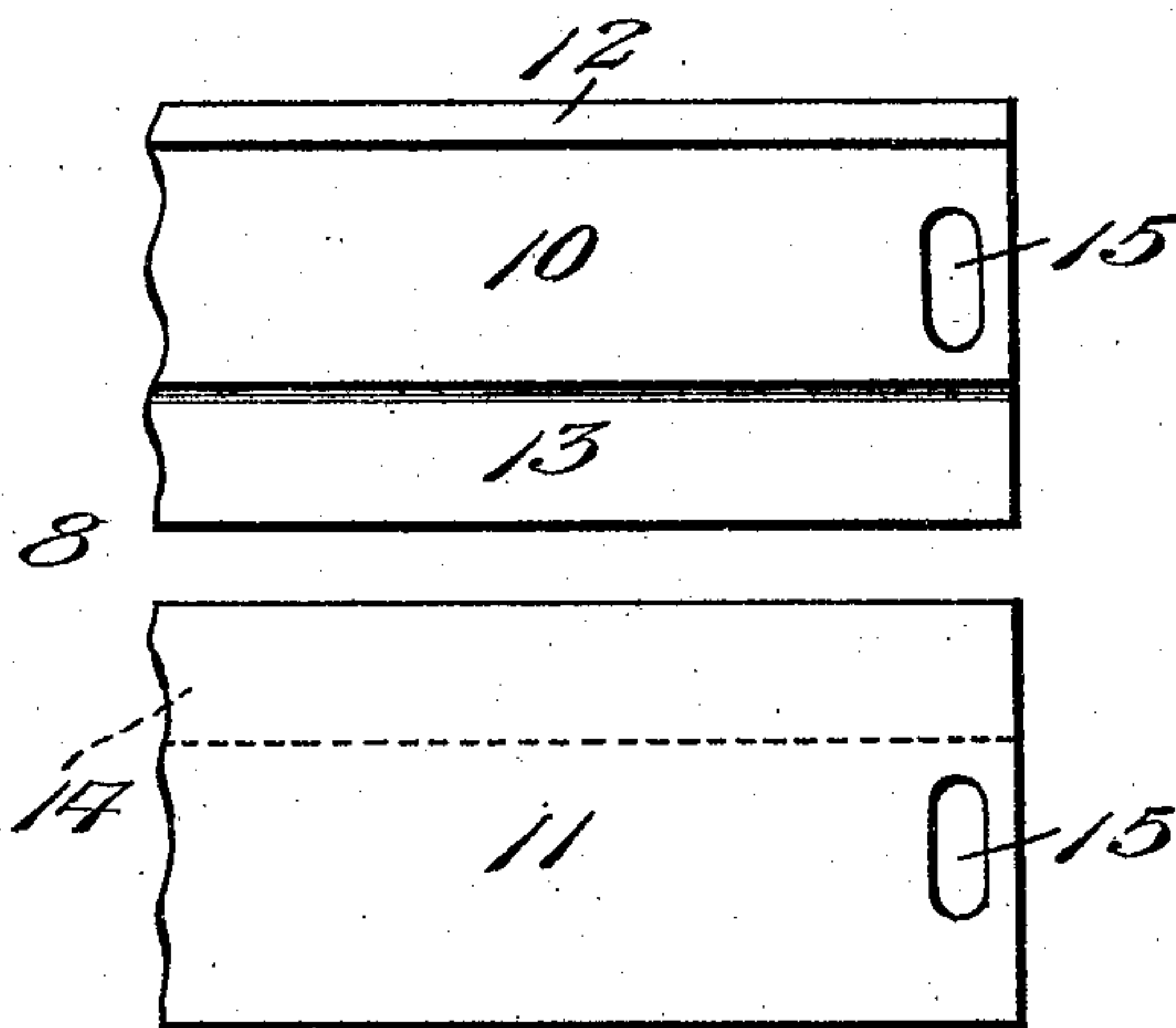
*Fig. 2.*



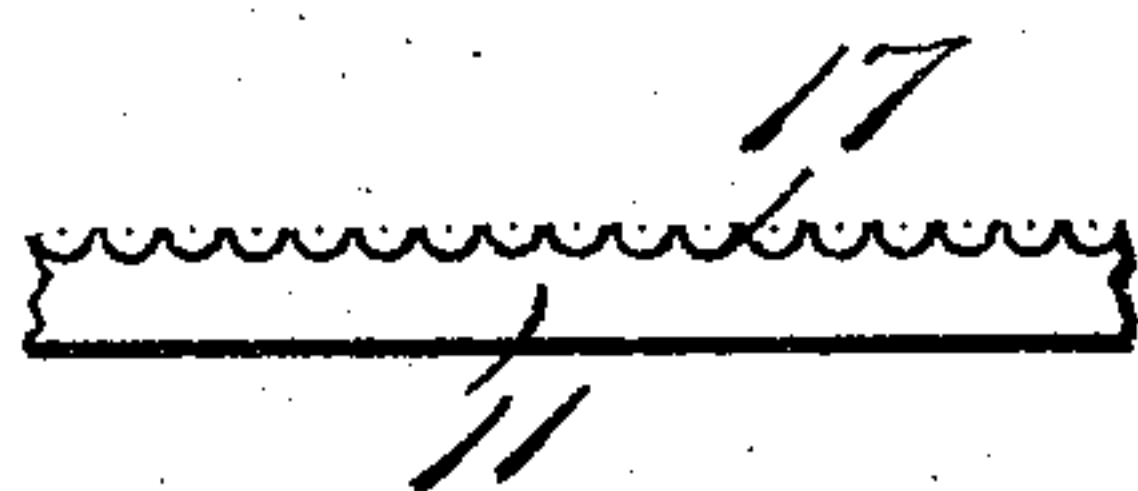
*Fig. 3.*



*Fig. 4.*



*Fig. 5.*



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# UNITED STATES PATENT OFFICE.

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## GRAIN-SCOURER.

No. 806,055.

Specification of Letters Patent.

Patented Nov. 28, 1905.

Application filed March 16, 1904. Serial No. 198,496.

*To all whom it may concern:*

Be it known that I, WILLIAM C. BRENNER, a citizen of the United States, residing at Rockport, in the county of Spencer and State of Indiana, have invented new and useful Improvements in Grain-Scourers, of which the following is a specification.

This invention relates to grain-scouring machines, and the improvements hereinafter described especially adapt the machine for scouring wheat, rye, barley, rice, oats, corn, &c.

The main object of the invention is to so improve the revolving cylinder, including the beaters thereof, that the grain during the scouring operation will be violently agitated and thrown back and forth against the beaters and the inner surfaces of the casing, the construction and arrangement of the beaters being designed to deliver the grains or kernels endwise against the abrasive and scouring surfaces of the casing, thereby effecting a much more thorough scouring and polishing of the grains during their passage through the casing.

It is well understood that the portion of each grain or kernel which comes in contact with the case of an ordinary grain-scouring machine is very small, owing to the oval shape of the grain or kernel.

The present invention aims to overcome this difficulty by subjecting practically half the surface of each grain or kernel to the scouring action of the beaters. Incident to this is, of course, the reduction in time in the scouring operation, or, conversely, the scouring of a greater quantity of grain in a certain time and within a machine of a certain capacity.

With the above and other objects in view, the nature of which will more fully appear as the description proceeds, the invention consists in the novel construction, combination, and arrangement of parts as hereinafter fully described, illustrated, and claimed.

In the accompanying drawings, Figure 1 is a sectional view through the case of a grain-scouring machine, showing the scouring-cylinder with its beaters arranged therein. Fig. 2 is a plan view of a portion of the outer working surface of one of the centrifugal beaters. Fig. 3 is a similar view of the inner working surface of one of the centripetal beaters. Fig. 4 is a plan view of the same looking from the opposite side and illustrating the rabbeted and overlapping engagement of the sections of the centripetal beaters. Fig. 5 is an edge

view of one of the beaters, showing the corrugated surface thereof.

Like reference-numerals designate corresponding parts in all the figures.

Referring to the drawings, 1 designates a scouring-machine case which is cylindrical, but otherwise may be of any desired or preferred construction and provided with suitable inlet and outlet openings. (Not shown.) Arranged centrally of the case 1 is the shaft 2 of the beating-cylinder 3, which preferably consists of spiders 4, the nearly radial arms 5 and 6 of which extend outward and are connected by obliquely-disposed end bars 7, which form seats for the centripetal beaters 8, the arms 6 being of greater length than the arms 5 and forming seats for the centrifugal beaters, as shown.

Each centripetal beater is composed of sections 10 and 11, 10 designating the forward section, which terminates in a beveled and comparatively sharp gathering edge 12, which moves in closer proximity to the inner surface of the case than any other portion of the scouring-cylinder. The sections 10 and 11 preferably extend entirely across the case, and said sections are provided with reversely-rabbeted and lapping portions 13 and 14 where they meet, thus providing for adjusting the width of each centripetal beater and advancing or retracting the gathering edge thereof and correspondingly advancing or retracting the rear edge of the same for bringing said rear edge to the proper relative distance from the centrifugal beater located in rear thereof.

In order to provide for the adjustment of the sections of the centripetal beaters above referred to, the end portions of the sections 10 and 11 are provided with transversely-elongated slots 15, which receive bolts 16, passing through openings in the seats 7, the slots 15 permitting said sections to be adjusted on the seats and firmly secured when brought to the proper adjustment.

A centrifugal beater 9 is located in rear of each centripetal beater, as clearly shown in Fig. 1, and at a suitable distance therefrom, the beater 9 extending obliquely across the plane of the centripetal beater located in advance thereof, so that the grain passing along the inner surface of the beater 8 will be delivered against the forward working face of the beater 9, traveling thence by centrifugal action along the working surface of the beater 9, from which it is hurled with considerable force against the inner surface of the case 1.



The inner surface of the rear section of the centripetal beater 8 is corrugated, as shown at 17, said corrugations extending transversely of the beater or in the direction of movement of the beater. The outer or working surface of each beater 9 is also corrugated, as shown at 18, the corrugations extending transversely of the beater or substantially parallel with the direction of movement of the outer portion of the scouring-cylinder.

In a cylinder twenty-four inches long, running at the rate of six hundred revolutions per minute, it usually takes wheat about fifteen seconds to pass through the machine, and it is estimated that the wheat passing from the inner surface of the case under the centripetal beater and over the centrifugal beater back to the case will change its course four hundred and fifty times in fifteen seconds and receive one hundred and fifty severe shocks, thus scouring the grain, while the shock or jar dislodges foreign matter from the entire body of the wheat, including the crease, which cannot be presented to the scouring-surface. In machines where the beaters are all at the same angle they form a ring of grain against the inner surface of the case that is seldom broken until it escapes from the machine. The breaking of this ring of grain is essential to the perfect scouring of the ends of the grain, and under the arrangement hereinabove described the ends of the grain are presented for scouring in the crushing action of the stream of grain each time the direction thereof is changed. By reason of the formation and arrangement of the corrugations 17 and 18 the grains or kernels follow along the corrugations endwise and are presented to and hurled against the inner surface of the casing, so that the extremities of the grains first strike the case and are thus scoured and freed from foreign matter. The grain is first taken up by the gathering edge of the centripetal beaters and is carried along the under side of the same toward the center of the cylinder and is discharged directly against the centrifugal beaters, the corrugations of which cause the separate grains or kernels to move lengthwise until they are delivered from and hurled by said beaters against the case. At the point on each centrifugal beater where the grain is delivered from the centripetal beater there is a slight bulk to the grain; but in moving outward along each centrifugal beater the velocity of the grain gradually increases while the bulk decreases, thus allowing the grain to follow the corrugations and to be individually hurled endwise against the case. The gathering edges of the centripetal beaters may be arranged close to the inner surface of the case, so as to take advantage of the rebound of the grain from the case caused by the shock or impact of the grain at such point.

To obtain a close or thorough scouring action, the forward section of each beater 8 should be moved close to the inner surface of the case, which has the effect of gathering the grain more rapidly and forcing the same inward, thus preventing the accumulation of a ring of grain around the inner surface of the case. It is well understood that the portion of a grain of wheat, rye, oats, barley, rice, &c., which comes in contact with a scouring-case is very small, owing to the oval shape of the grain. By providing the corrugations on the different beaters and arranging them as shown and described nearly one-half of each grain or kernel comes in contact with the corrugations and is thus subjected to the scouring action. The grain is thus uniformly scoured and polished and the capacity of the machine greatly increased.

The greatest accumulation of grain under ordinary conditions takes place between the lowest point of the case and a point about half-way up the ascending side of the case. The beaters 11 should therefore be adjusted relatively to the beaters 9, so as to hold the flood of grain deposited thereon when the edges 12 enter the accumulated grain, the adjustment being such that the grain will have been fed through the opening between each pair of beaters 11 and 9 by the time the edge 12 of the beater 11 reaches the same point again in the next revolution. This insures an even circulation.

I am aware of a prior patent showing a centrifugal dressing-machine comprising a casing containing a beating-cylinder provided with beaters arranged in pairs, the several pairs being disposed or spaced some distance apart around the periphery of the beating-cylinder, each pair comprising a centripetal and a centrifugal beater mounted in fixed (non-adjustable) relation to each other and to the casing, the centripetal beaters being arranged in advance of the centrifugal beater to deflect the grain thereto, whereby in the rotation of the cylinder the gathered grain is first thrown centripetally against the centrifugal beater and then thrown by centrifugal force by the latter against the casing, thus obtaining two distinct beating operations instead of one, as in ordinary grain-scourers using centrifugal beaters alone, at each point around the periphery of the beating-cylinder where the beaters are provided. This construction of centripetal dressing-machine is effective for the dressing of granular or pulverulent materials—such as flour, middlings, and the like, and some kinds of grain and seed—but is ineffective for the dressing or treatment of seeds or grain which vary to a material extent in size, shape, weight, texture, and construction.

It is of the utmost importance in the provision of a machine having a wide range of operation for treating different grains and



seeds to construct and arrange the centripetal and centrifugal beaters in such manner that the centripetal beaters may be thrown out of action to permit the centrifugal beaters to operate alone to perform the ordinary scouring action and to enable said centripetal beaters to be adjusted also to regulate their action upon the grain, as well as to provide effective means to cause the gathered grain to be thrown endwise against the centrifugal beaters and acting portion of the casing to thoroughly clean and prevent breakage of lengthy grains which cannot be thrown broadside against the operating parts without injury thereto. In order to provide a machine which will operate effectually upon grains of widely different characteristics, I not only mount the centripetal beaters 8 upon the seats 7 in the manner described, but arrange the centripetal and centrifugal beaters in pairs, each pair comprising a centrifugal and a centripetal beater, the centripetal beater of each pair being arranged in advance of its coacting centrifugal beater, and I also so mount and arrange the beaters of each pair relatively to each other that the gathering edge 12 of the centripetal beater projects beyond and follows closely in rear of the outer edge of the centrifugal beater of the pair in advance thereof, while the rear edge of said centripetal beater projects in close relation to the centrifugal beater of the same pair. By this arrangement and by the structural organization of each centripetal beater heretofore described it will be observed that the gathering-section 10 of the centripetal beater is adjustable, so as to move its gathering edge 12 closer to or farther from the rim of the casing 1, while the rear or inner edge of the delivery-section 11 of said beater is adjustable toward and from the following centrifugal beater 9 of the same pair, the arrangement of the rear edge of the said delivery-section 11 relative to the centrifugal beater 9 in rear thereof being such as to provide a throat or passage between the two through which the grain fed by the centripetal beater to the following centrifugal beater passes outwardly to be thrown by the centrifugal beater against the wall of the casing. Thus the sections 10 and 11 of each beater may not only be adjusted in unison to move the beater bodily toward and from the casing and following centrifugal beater, but said sections may be independently adjusted to arrange the beater for various operations in the treatment of the grain. It will be further observed that the corrugations of the centripetal beater are disposed wholly upon the inner face of the delivery-section 11 of said beater, while the gathering-face of the section 10 is smooth or plane-surfaced, and the operating-face of the beater 9 is corrugated from edge to edge thereof transversely in the direction of rotation of the cylinder. This construction is important, as will appear from the following description.

In scouring corn it is found that the action of a machine having both centripetal and centrifugal beaters is too violent, the corn because of its relatively great weight and peculiar shape being shattered by the multiplicity of impacts against the surfaces of the beaters and casing. In order to remedy this defect and to adapt the present machine for scouring corn without injury thereto, the centripetal beaters are thrown completely out of action by adjusting them inwardly, so as to bring the gathering edges 12 thereof inwardly of the outer edges of the centrifugal beaters and simultaneously by the inward movement of the centripetal beaters causing the delivery-sections thereof to partially or wholly close the throats or passages between the same and the centrifugal beaters. The outer edges of the centrifugal beaters will then project to a greater extent, allowing the grain or corn to increase in area or thickness inwardly from the rim of the cylinder, so that the centrifugal beaters will alone operate upon the same, thus converting the machine into an ordinary scourer, the action of which will be sufficient for corn and hulled rice, as there is no fuzz to be removed from these grains. When in practice it is found necessary to deflect the ring of grain to a greater or less extent, this is accomplished by adjusting the centripetal beater outwardly, so that its gathering edge 12 projects to a greater or less extent beyond the circular path of the beater 9, whereby any portion of the ring of grain may be deflected to the acting face of the beater 9 and thence to the case along the corrugations of said beater, the balance or remainder of the ring of grain staying against the case to form a cushion for the portion delivered by the beater 9, which is an effective mode of operation in the treatment of frail grain, as the cushioning portion of the ring will prevent the same from striking too violently and being broken. In the removal of the hulls from rice a different mode of operation is pursued, the gathering edge 12 of the centripetal beater being adjusted close to the scouring-case, so as to gather practically all the grain from the case, the rice passing along the under side of the beater 8 and being delivered thereby to the beater 9. In moving outward on the beater 9 the grains of rice are forced to seek the lowest point on the face of the beater by reason of the force or pressure against the grain caused by the speed of the beater and falls into the corrugations 18, by which they are turned and caused to be hurled by the beater endwise against the case. The successive repetitions of this operation during the entire passage of the grain through the case causes the breaking down of the arched ends of the hulls, whereby the grains are liberated. It will be understood, of course, that the rice taken up by the gathering edge of the centripetal beater first falls down the plane working face of the gathering-section 10 of



said beater, is then turned endwise by the corrugation 17 on the delivery-section 11 of the beater, and thrown in such position against the corrugated face of the beater 9, whose corrugations at 18 in turn adjust the rice to be thrown endwise against the case, thus preventing the grain from being cast sidewise in either instance against the operating-surface and preventing breakage of the kernel thereof. This mode of operation is essential and the most effective in polishing or scouring the ends of wheat, rye, and hulled oats and in hulling rice, barley, and oats, which grains can only be effectually treated by endwise impact in the direction of their greatest extent or major axis, as a shock or impact sufficient to polish or remove the hulls by a broadside contact would result in the kernel of the grain being injured or broken.

It is well known that the greatest accumulation of grain in machines of this class occurs on the bottom and ascending side of the scouring-case. When the gathering edge 12 of the centripetal beater enters this accumulation, it scoops up, as it were, a greater amount of grain than it is possible for it to take at any other point in the path of revolution of the beating-cylinder. This grain is delivered to the coacting beater 9 and is thrown out in bulk against the ascending side of the case, thus ordinarily causing serious hammering at this point in the case. Another disadvantage of taking up this excessive amount of the grain is that such a quantity of grain cannot be properly adjusted by the corrugated face of the beater 9. In order to overcome this difficulty, the throat or passage between the centripetal beater and the following centrifugal beater may be contracted by adjusting the inner edge of the delivery-section 11 of the centripetal beater toward the corrugated face of the centrifugal beater, the said inner edge of the section 11 being thereby brought into position to serve as a dam or regulator to control the feed of the flood of grain along the corrugations 18 and spreading the same evenly thereover, so that the grain will be properly adjusted before it is thrown by the beater 9 against the case.

It will thus be seen that the peculiar arrangement of the sets of beaters and adjustability of the centripetal beaters 8 in my improved construction of machine permits the centripetal beaters to be rendered inoperative when their use is not required and enables these beaters to be adjusted to control the feed of the grain in the most efficient manner to enable grains which vary in size, shape, weight, texture, and construction to be treated without injury.

Having thus described the invention, what is claimed as new is—

1. A grain-scourer comprising a scouring-case, a rotary cylinder therein, and a series of centripetal and centrifugal beaters carried by

said cylinder, each centripetal beater having a plane gathering portion and a corrugated delivery portion to deliver the grain endwise against the following centrifugal beater.

2. A grain-scourer comprising a scouring-case, a rotary cylinder therein, and a series of centrifugal and centripetal beaters carried by the cylinder, each centrifugal beater having a corrugated working face and each centripetal beater a plane gathering portion and a corrugated delivery portion to deliver the grain endwise against the corrugated surface of the following centrifugal beater, the latter acting to deliver the grain in like manner against the case.

3. A grain-scourer comprising a scouring-case, a rotary cylinder therein, and a series of centripetal and centrifugal beaters carried by said cylinder, said beaters being arranged in pairs, the centripetal beater of each pair being arranged in advance of the centrifugal beater and consisting of adjustable gathering and delivery sections, said sections being respectively adjustable toward and from the casing and toward and from the working surface of the centrifugal beater.

4. A grain-scourer comprising a scouring-case, a rotary cylinder therein, and a series of beaters carried by said cylinder, said beaters being arranged in pairs, each beater comprising a centripetal and a centrifugal beater, the centripetal beater being arranged in advance of the centrifugal beater in the direction of rotation of the cylinder, and each centripetal beater comprising gathering and delivery sections independently adjustably connected to the cylinder, whereby said centripetal beater may be adjusted bodily toward and from the casing or its sections adjusted independently relative to the case and the working face of the centrifugal beater.

5. A grain-scourer comprising a scouring-case, a rotary cylinder therein, a series of centripetal beaters carried by said cylinder and each comprising adjustable delivery and gathering sections, the former having a plane and the latter a corrugated working face, and a series of centrifugal beaters also carried by said cylinder and provided with working faces corrugated transversely thereof relative to the direction of rotation of the cylinder, said beaters being arranged in pairs, each pair comprising a centripetal beater and a following centrifugal beater, the construction and arrangement being such that the sections of each centripetal beater are respectively adjustable toward and from the case and toward and from the working face of the cooperating centrifugal beater.

In testimony whereof I affix my signature in presence of two witnesses.

WILLIAM C. BRENNER.

Witnesses:

E. D. EHRMAN,  
CHAS. T. BAKER.