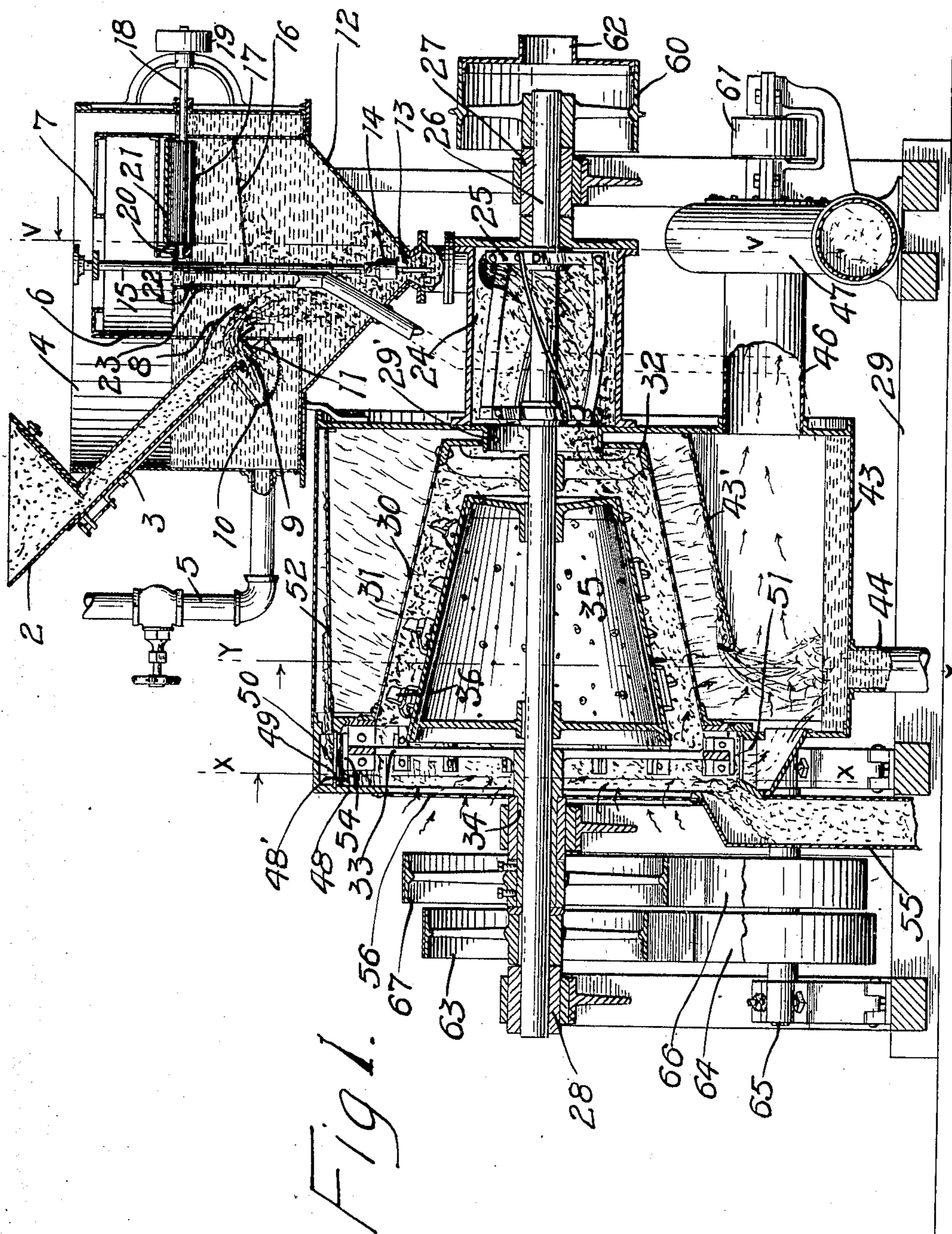


No. 871,517.

PATENTED NOV. 19, 1907.

J. McDANIEL.
WHEAT WASHING MACHINE.
APPLICATION FILED OCT. 27, 1906.

4 SHEETS—SHEET 1.



WITNESSES

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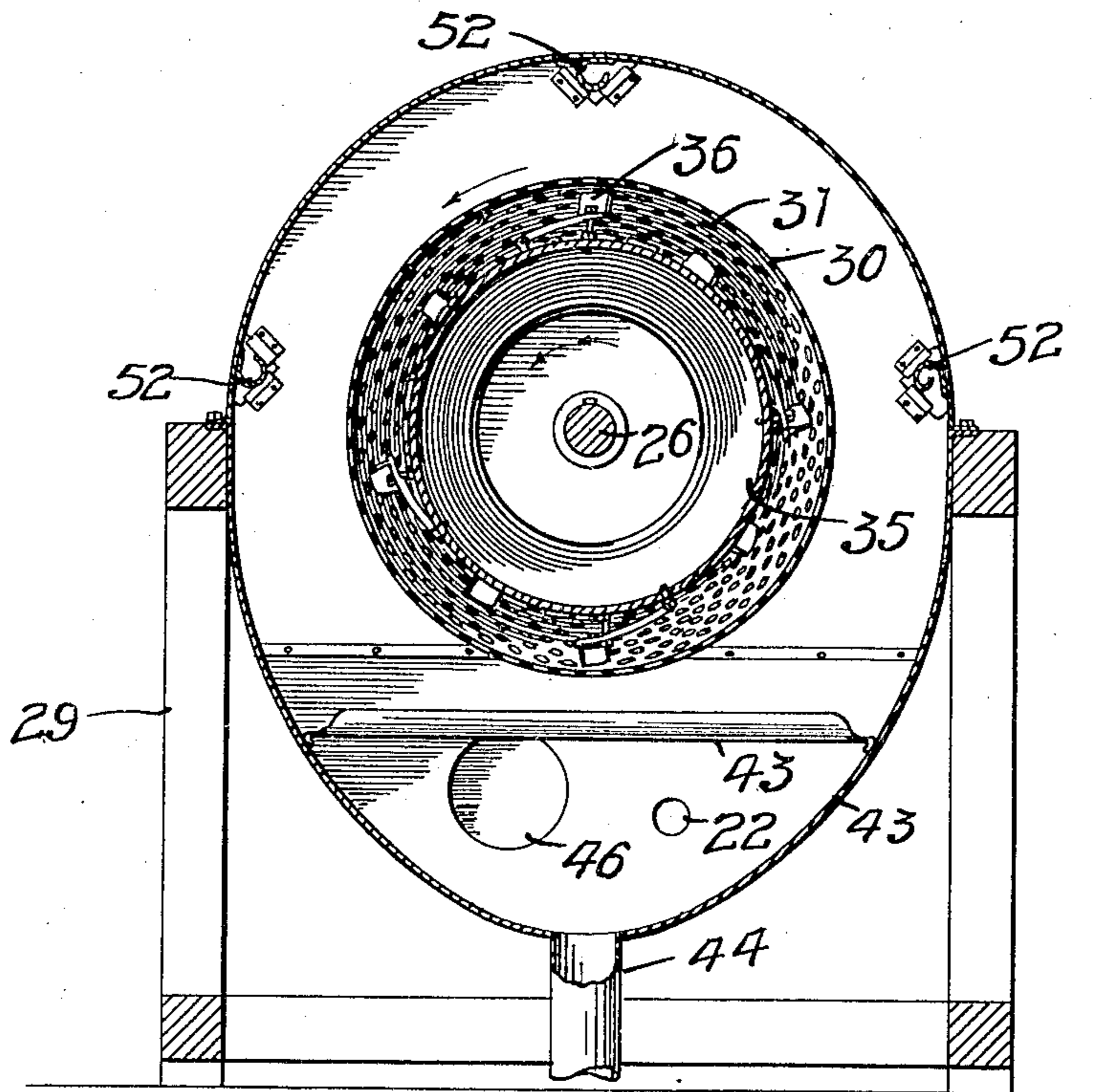


Fig 2.

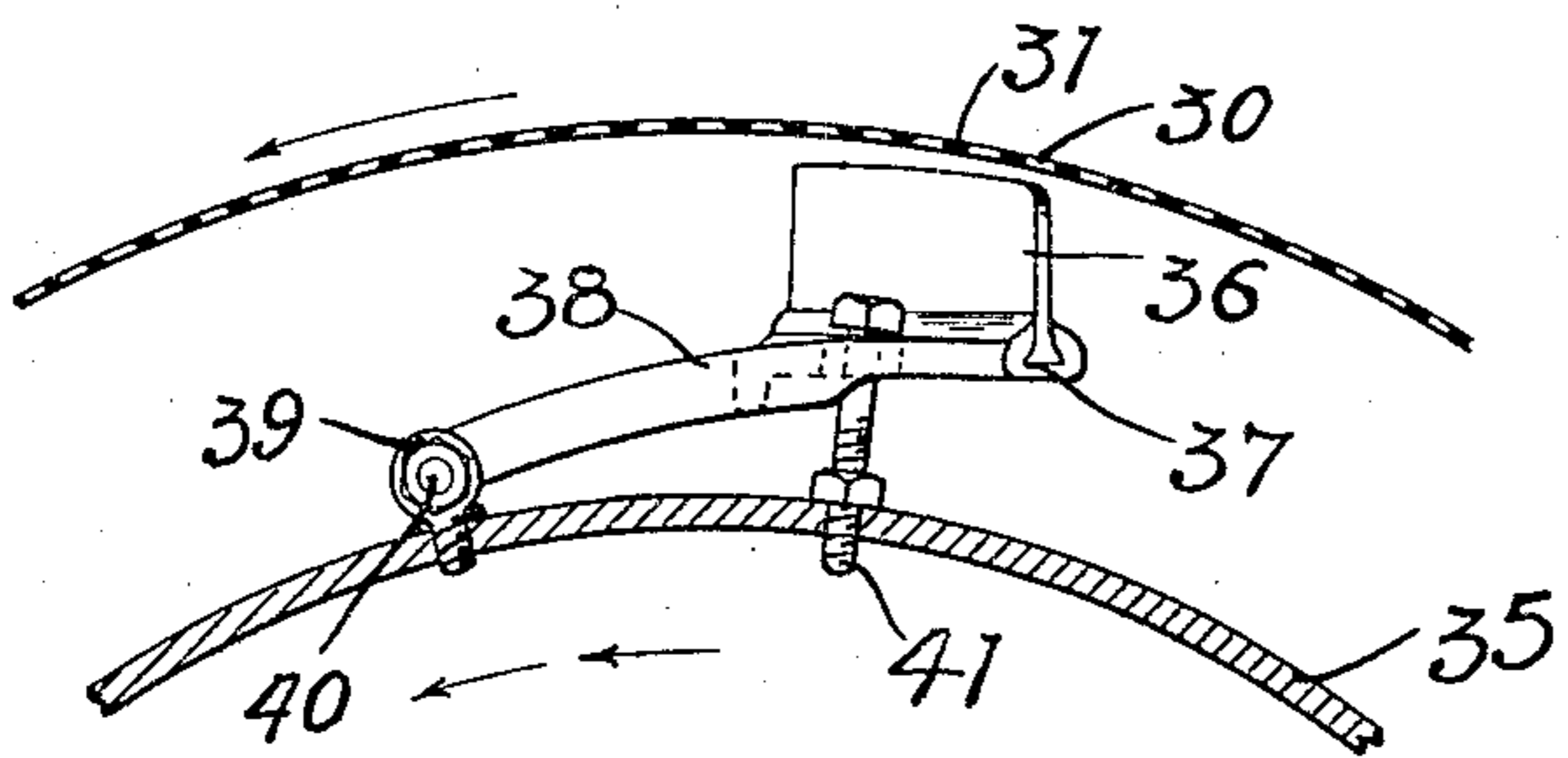


Fig 3.

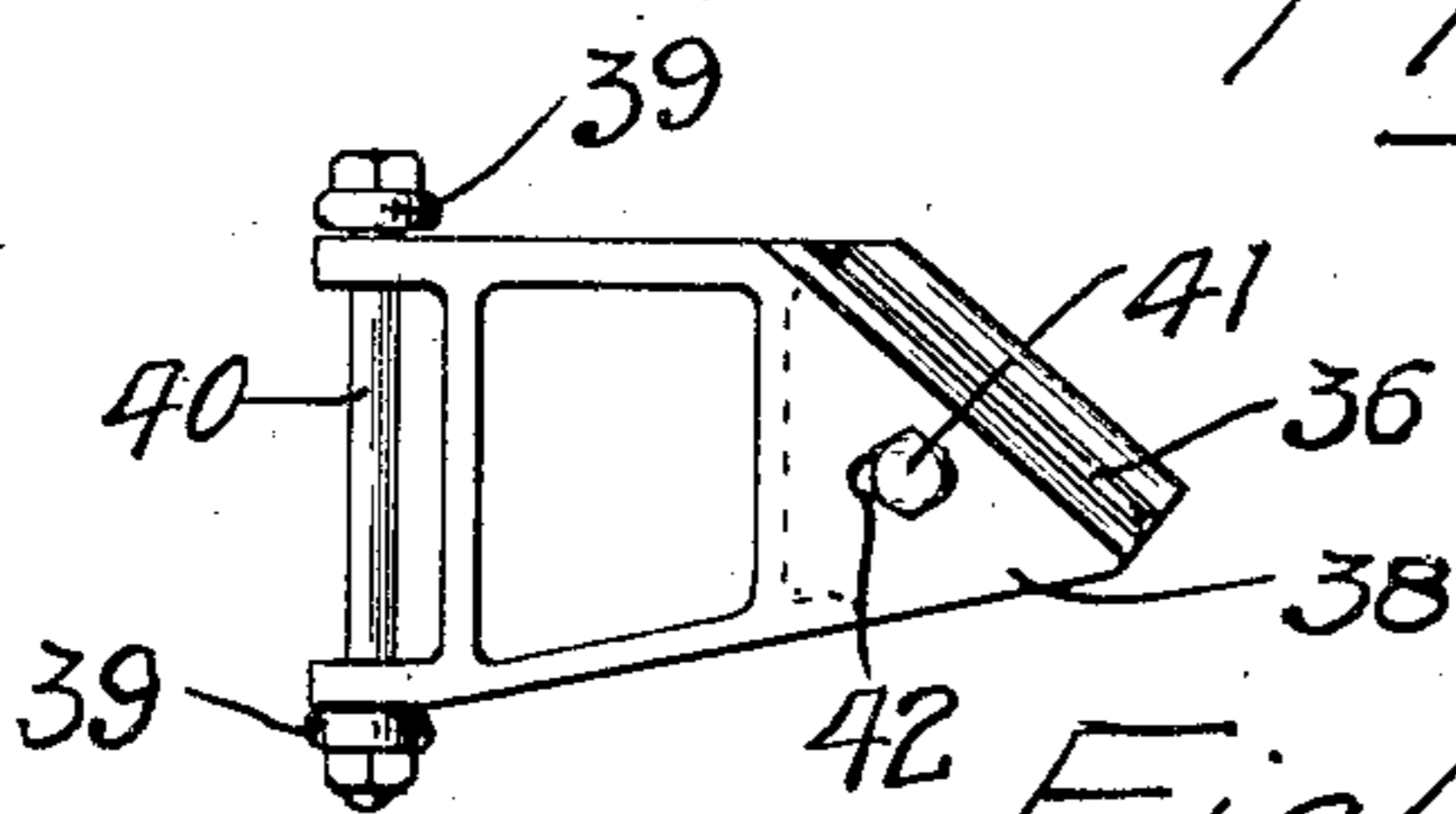


Fig 4.

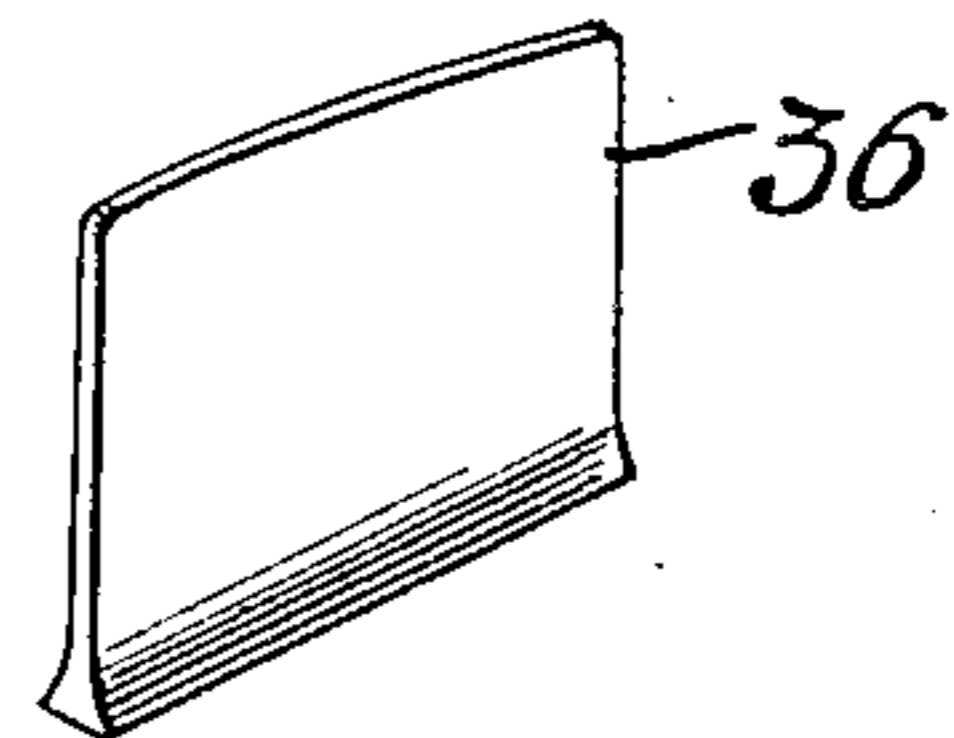


Fig 5.

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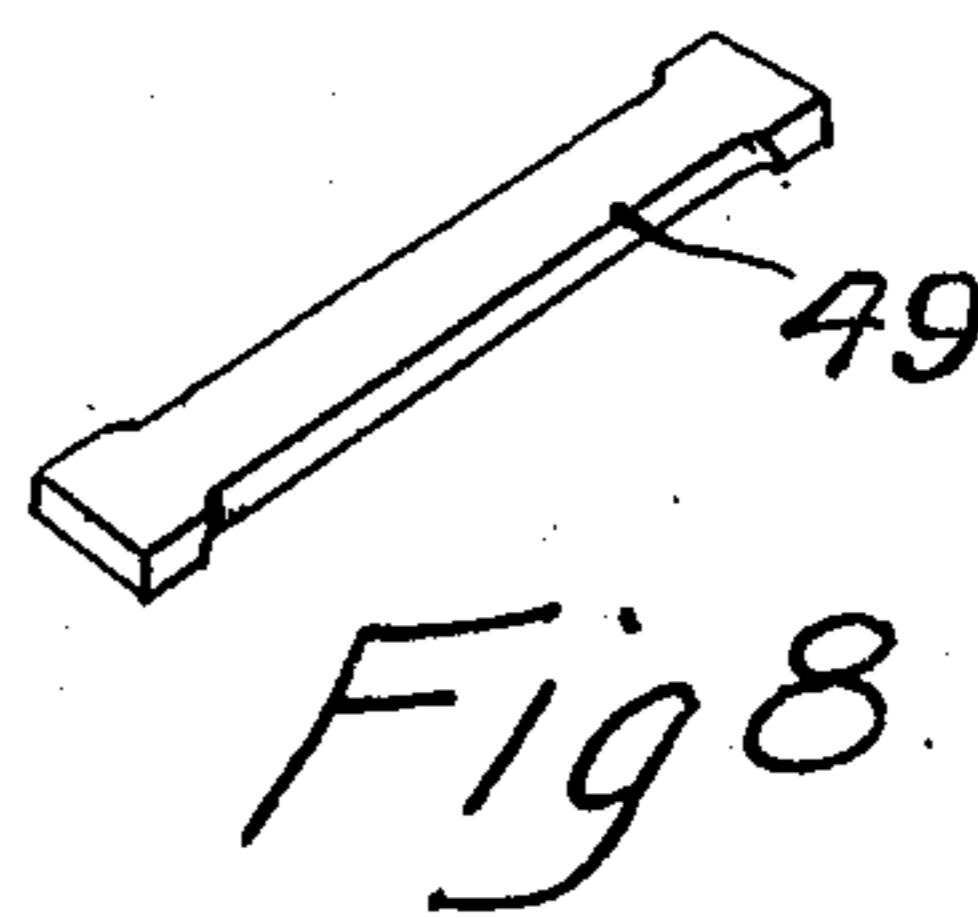
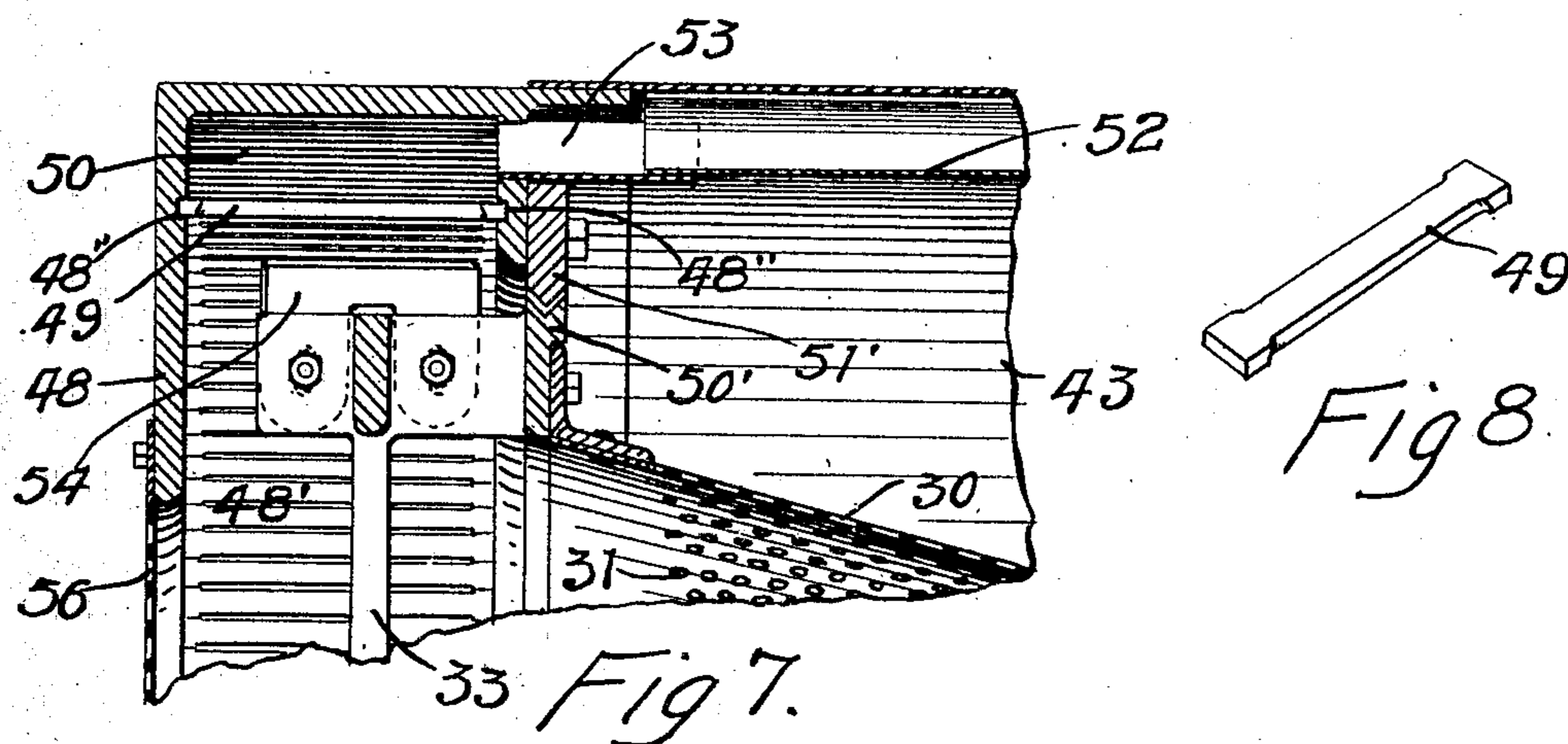
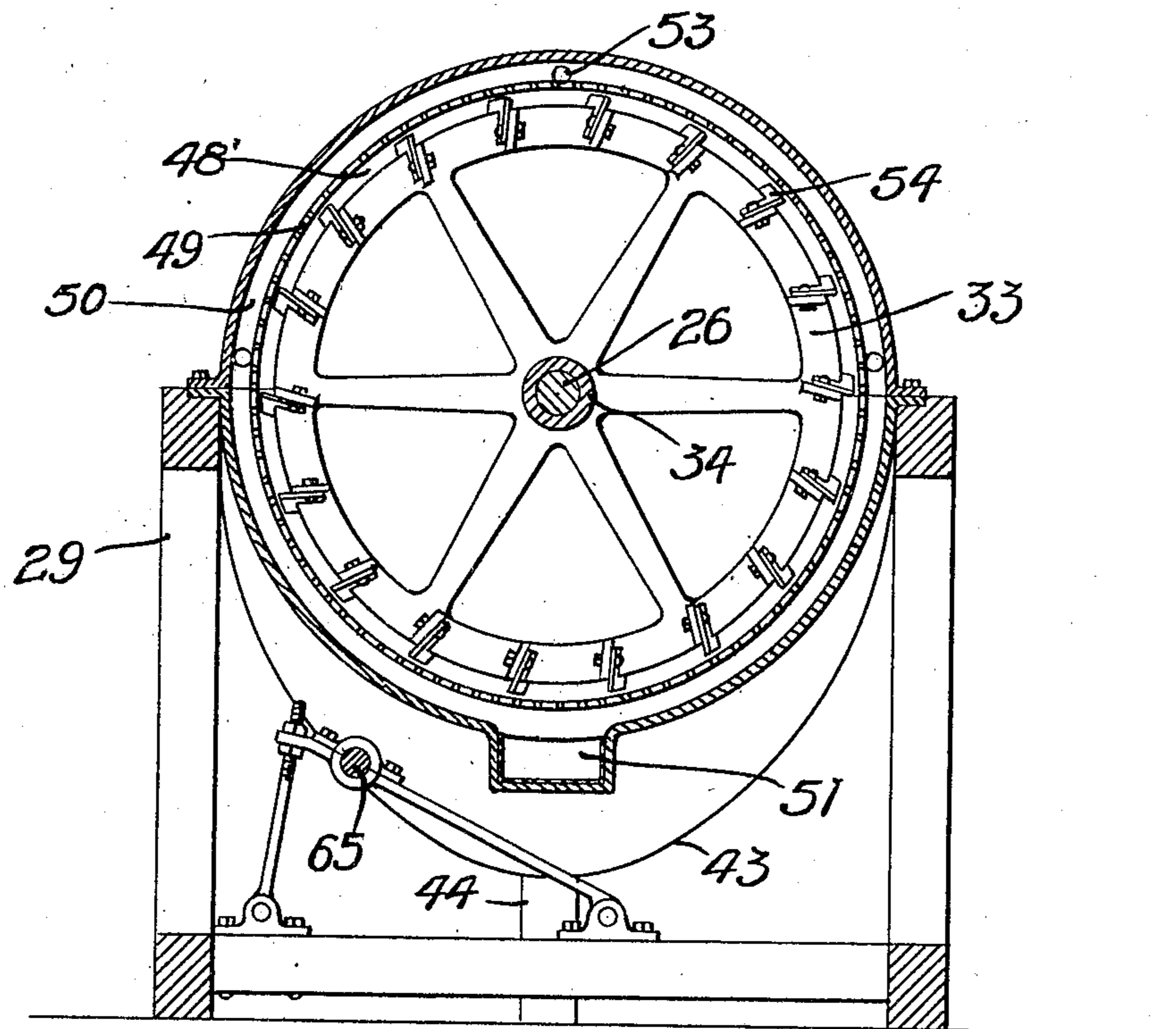
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4 SHEETS—SHEET 4.

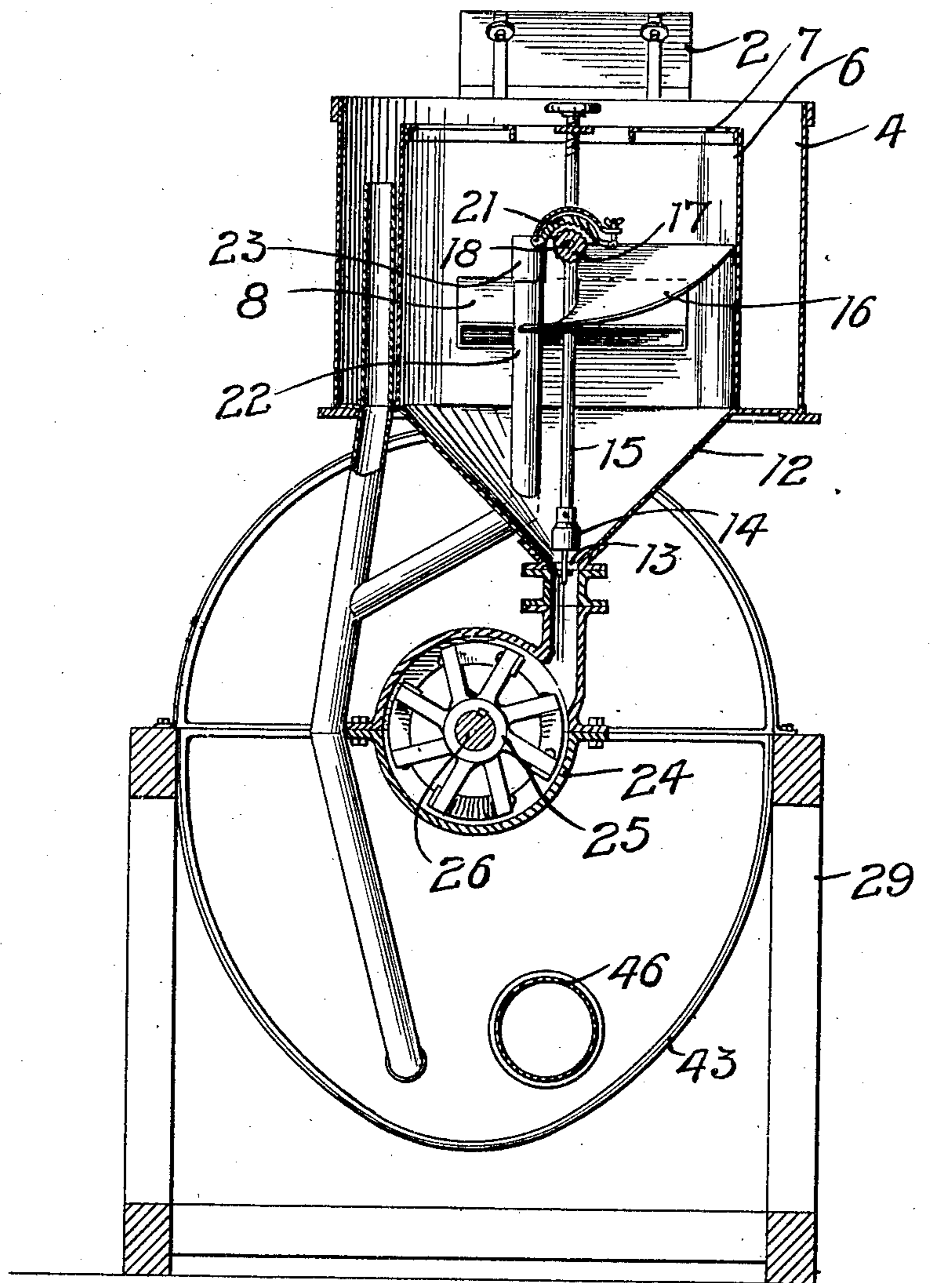


Fig. 9.

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UNITED STATES PATENT OFFICE.

JAMES McDANIEL, OF MINNEAPOLIS, MINNESOTA.

WHEAT-WASHING MACHINE.

No. 871,517.

Specification of Letters Patent.

Patented Nov. 19, 1907.

Application filed October 27, 1906. Serial No. 340,865.

To all whom it may concern:

Be it known that I, JAMES McDANIEL, of Minneapolis, Hennepin county, Minnesota, have invented certain new and useful Improvements in Wheat-Washing Machines, of which the following is a specification.

The object of my invention is to improve the machine shown and described in Letters Patent of the United States to me December 22, 1896, and numbered 573,686, and 573,687.

The invention consists generally in means for effecting a thorough separation of the "white caps" or husks from the kernels of imperfectly threshed grain and thereby preventing such grain from being carried off by the lighter refuse particles clinging thereto.

Further, the invention consists in means whereby all surplus water on the surface of the grain or in its outer skin or bran covering, will be jarred or thrown off without any scouring action whatever.

Further, the invention consists in various constructions and combinations, all as hereinafter described and particularly pointed out in the claims.

In the accompanying drawings, forming part of this specification, Figure 1 is a vertical sectional view of a wheat-washing machine embodying my invention. Fig. 2 is a transverse vertical sectional view on the line $y-y$ of Fig. 1. Figs. 3, 4 and 5 are detail views of the wings or flights carried by the straining drum. Fig. 6 is a transverse sectional view on the line $x-x$ of Fig. 1. Fig. 7 is a detail sectional view showing the means for effecting the final drying operation. Fig. 8 is a detail view of one of the chill plates used in such final operation. Fig. 9 is a transverse vertical sectional view substantially on the line $v-v$ of Fig. 1.

In the drawing, 2 represents the grain hopper having a discharge spout 3 extending downwardly into a tank 4 containing a supply of water from a pipe 5. A substantially cylindrical casing 6 having a top 7 is provided within the tank 4 and has an opening in its side wall to receive the open lower end 8 of the spout 3. Near said open lower end the spout is provided with an opening 9 in its under side communicating with the tank 4 and arranged above a curved shelf 10. A wall 11 is formed between the opening 9 and the mouth of the end 8 for the purpose of effecting a separation by gravity of the gravel and heavier foreign material from the

wheat as it flows down the spout into the tank. This device, however, is substantially the same as that shown in my former patents above referred to.

The tank 4 has a hopper bottom 12 provided with a discharge opening 13 arranged to be closed by a valve 14 having an operating rod 15 which extends up through a cross bar on the top 7. A guard plate 16 is spirally arranged within the casing 6 and near the top of this plate is a corrugated roller 17 mounted on a shaft 18 having a driven pulley 19 and provided with a bearing 20 at its inner end. A curved adjustable plate 21, also corrugated, is arranged above the roller which is operated at a high speed and is preferably located near the top of the water in the tank and by its coöperation with the plate agitates the light material and the imperfectly threshed grain floating up toward the surface of the water and completely cleans it of all husks, and any foreign matter which may be clinging thereto and which would otherwise prevent the wheat from sinking and would cause it to be carried off through the waste pipe 22 and mingle with the other refuse of the machine.

The movement of the roller through the surface of the water causes little currents or eddies to be formed therein which circle out around the tank and under the corrugated plate and bring to the roller all the imperfectly threshed grain which may rise and be floating around in the tank. Complete separation of the husks from the grain is thus insured. The waste pipe has a telescoping extension 23 at its upper end by means of which the level of the water in the tank may be regulated.

I do not wish to be confined to the particular location of the revolving roller and its plate or to the precise form shown herein, the invention consisting essentially in means whereby the imperfectly threshed grain will be thoroughly stirred up and agitated sufficiently to separate the husks therefrom. As soon as the grain has been discharged from between the roller and its overhanging plate it will sink to the bottom of the tank, being freed from the lighter or more buoyant material and will pass down through the opening 13 into a receptacle 24 wherein a beater 25 is arranged upon a shaft 26 which has bearings 27 and 28 on a suitable frame 29. This beater is substantially the same as the one shown and described in my former patents

and detailed description will be unnecessary in this case.

The receptacle has an open end 29' leading into a conical drum 30 having a series of perforations 31 and supported at its end upon spiders 32 and 33, the former loosely mounted on the shaft 26 and the latter secured on a sleeve 34 also loosely mounted on said shaft. A conical drum 35 is secured on said shaft within the perforated drum 30 and spaced therefrom and provided at intervals on its periphery with a series of flights 36 fitting within sockets 37 on plates 38 that are pivotally supported on the drum 35 by means of ears 39 and bolts 40. The flights are arranged diagonally with respect to their direction of movement and sweep by the inner surface of the drum 30 and are adjustable toward or from said surface by means of bolts 41 fitting within slots 42 in the plates 38 and having a threaded connection at their inner ends with the drums 35. These plates have a function similar to the devices on the drums shown and described in my former patents.

The drums are inclosed by a casing 43 having a waste pipe 44 and a pipe connection 46 with a suction fan 47 for the purpose of creating a draft of air through the machine to aid in drying the grain. An apron 43' is arranged in the casing above the pipe 46 to prevent the water thrown off by the revolving drums from being drawn down into the fan. The grain passing from the receptacle 24 into the space between the drums 30 and 35 will be held by centrifugal force against the inner surface of the drum 30 and a large portion of the water will be thrown out through the perforations 31 into the water chamber inclosed by the casing 43. At the same time the flights 36 will move the grain lengthwise of the drums toward their larger ends into a stationary casing 48 formed preferably of two semi-cylindrical castings and inclosing a chamber 48'. Annular grooves 48'' are provided in said castings and a series of narrow plates 49 are fitted within said grooves equidistant from the center of the chamber and separated from its periphery by an annular space 50 which has a refuse discharge opening 51 leading to the casing 43. A ring 50' is secured to the drum 30 and to the spider 33 and has a V-shaped joint with a stationary ring 51', said joint permitting the free revolution of the drum 30 but preventing the passage of water from the chamber inclosing said drum and also preventing the escape of wheat from the chamber 48'. Gutters 52 are provided on the inner surface of the casing 43 to collect a portion of the water thrown outwardly from the straining drum and deliver it through pipes 53 into the annular space 50 for the purpose of preventing fine refuse material from collecting in and clogging the said space. Upon the arms of the spider 33 I provide beater blades 54 set at a suitable angle

to their direction of movement and adapted to sweep by the stationary plates 49. The plates 49 which are chilled to prevent wear, are set sufficiently near together to prevent the wheat kernels from passing between them while allowing the passage of air and refuse into the space 50. The beater blades 54 extend only partially across the chamber 48' leaving one side thereof unobstructed as indicated in Fig. 7.

The grain delivered from between the revolving strainer cylinders will be moving at a high rate of speed when it passes into the chamber 48' and upon emerging from between the walls of the cylinders will fly outwardly and strike the plates 49 and will be deflected thereby into the unobstructed portion of the chamber. Any water that may be clinging to the surface of the grain or that has penetrated its outer surface will be jarred or thrown off by the contact of the kernels with the plates 49 and will fall upon said plates or pass through between them into the space 50. The beater blades 54 will be operating at the same speed as the drum 30 and as the wheat entering the chamber 48 will be moving at substantially the same speed it follows that the beater blades either will not contact with the grain at all, or if they do will not in connection with the stationary plates have a scouring effect thereon.

If any of the grain does contact with the blades in the chamber 48 it will be directed by their pitch or inclination toward the unobstructed portion. Apparently, however, in the operation of the machine the greater bulk of the grain discharged from between the rapidly revolving straining cylinders will as it emerges from between them assume a flaring ring-like form and be directed tangentially against the plates 49 and striking thereupon will be freed from surplus water and will pass on into the unobstructed portion of the chamber without being struck by the beater blades. Any water that may be clinging to the surface of the grain and shook off by the contact with the plates 49 and falling upon them will be blown out into the space 50 by the blast of air created by the beaters.

I have found in other machines where grain is delivered to a chamber containing rapidly revolving beaters that it will be thrown outwardly by such beaters and a scouring action will be produced. In my machine, however, the grain is delivered while moving in a rotary direction at substantially the same speed as the beaters and any water on the surface of the grain or in its outer covering will be thrown off when the grain contacts with the chilled plates and blown away by the air blasts from the beater blades without causing any scouring action whatever on the grain. This drying of the grain or removal of the surplus water from its surface

and the outer covering or skin of bran without roughing up or breaking such skin, I regard as a very important feature of my invention.

5 A grain discharge spout 55 communicates with the chamber 48' and a screen 56 is arranged in the wall of the chamber through which air is drawn by the suction fan into the machine.

10 To operate the machine, I provide a driving pulley 60 at one end of the shaft 26 having a sufficiently wide face to belt from it to the pulley 61 of the fan and having a smaller pulley 62 for connection with the pulley 19.

15 At the opposite end of the shaft a pulley 63 is secured thereon and belted to a pulley 64 secured on a counter shaft 65. A pulley 66 also secured on the said counter shaft is belted to a larger pulley 67 secured on the sleeve 34. The effect of this system of driving is to operate the drums 30 and 35 in the same direction but at different speeds, the drum 35 operating much faster and its wings sweeping over the surface of the drum 30 to work the grain out from between the drums and into the chamber 48'.

I claim as my invention:—

30 1. In a wheat-washing machine, the combination, with a tank adapted to contain a supply of water, of a corrugated roller operating in said tank near the surface of the water, means for revolving the roller at a high speed and said roller producing eddies or currents in the water and causing it to circulate in the tank, a curved plate or guard located above said roller and extending across the same from side to side, a narrow passage being formed between said guard and roller through which the imperfectly threshed grain is conducted by said eddies or currents, a spout arranged to deliver the grain in said tank below said roller and a guard plate located within said tank beneath said roller.

45 2. In a wheat-washing machine, the combination, with a water tank and a grain delivery spout leading thereto, of a spirally arranged plate located within said tank, a revolving roller, a guard plate overhanging said roller and between which plate and roller the imperfectly threshed grain is guided by the current of water caused by the motion of said roller, substantially as described.

55 3. In a wheat-washing machine, a cylindrical chamber having a series of stationary plates arranged in a circle within said chamber and spaced from its periphery and from one another, the space inclosed by said plates having a grain discharge opening and the space within said chamber outside of said plates having a waste opening, a series of beater blades arranged to revolve in said chamber, and means for discharging grain in an annular stream into said chamber against said plates, the grain moving when it enters said chamber at substantially the

same speed as said beaters, substantially as described.

4. In a wheat-washing machine, the combination, with a drum having a cylindrical chamber therein, of a series of plates mounted in said chamber and spaced from the periphery thereof and separated from one another sufficiently to allow water and fine refuse material to pass between them, but too near together to allow the passage of grain, means for delivering grain into the space inclosed by said plates and directing it against them whereby the water clinging to the surface of the kernels will be thrown off against the plates, and blades mounted within said chamber and arranged to sweep past said plates and create a blast of air through them and extending only partially across said chamber whereby an unobstructed space will be provided at one end thereof into which the grain is directed from said plates, substantially as described.

5. In a wheat-washing machine, the combination, with a shaft, of drums mounted therein, the outer one having a series of perforations and the inner one having a series of peripheral wings and operating at a higher speed than the other one, a stationary casing inclosing said drums and provided with a series of interiorly arranged gutters in position to receive a portion of the water thrown through said perforated drum, a chamber whereto the grain is delivered from between said drums in a revolving annular stream, a series of plates spaced from one another and from the periphery of said chamber, and against which plates the grain is directed and deflected and the surface water thrown off, the space between said plates and the periphery of said chamber communicating with said gutters and having a waste discharge opening, and blades mounted on said shaft and arranged to revolve past said plates and create currents of air between them, substantially as described.

6. In a wheat-washing machine, the combination, with a shaft, of a sleeve loosely mounted thereon, a spider secured on said sleeve, a conical drum having a series of perforations and connected to said spider, a second drum inclosed by said first named drum and secured on said shaft, a space being provided between said drums whereto the grain is delivered, a series of wings provided on said inner drum, a casing inclosing said drum, a chamber whereto the grain is delivered from between said drums, a series of plates provided within said chamber and inclosing the space whereto the grain is delivered, said plates being spaced from one another and from the periphery of said chamber and against which plates the grain is thrown from between said drums in a rapidly revolving stream, and blades carried by said spider and adapted to sweep past said

plates and blow off the water dislodged by the contact of the grain with said plates.

7. The combination, with the revolving strainer drums between which the grain is fed and revolved at a high speed, of a stationary casing having a chamber arranged to receive the grain in an annular stream from said drums, plates arranged in said chamber and spaced from its periphery and from one another and against which plates the grain strikes and is deflected, and revolving beaters provided in said chamber and arranged to sweep past said plates and moving at substantially the same speed as the stream of grain, whereby scouring is prevented, substantially as described.

8. In a wheat-washing machine, revolving strainer drums arranged one within the other and having a space between them whereto the grain is delivered, the outer drum being perforate and the inner drum imperforate, plates hinged on the periphery of the inner drum at intervals and having sockets at one end, flights removably mounted in said sockets and arranged at an angle to their direction of movement and edgewise with respect to the outer drum and means for adjusting said plates to move said flights toward or from the inner surface of the outer drum, substantially as described.

9. The combination, with the revolving strainer drums between which the grain is fed and revolved at a high speed, of a stationary casing inclosing said drums, a series of interiorly arranged gutters carried by said casing, a chamber whereto the grain is delivered from said drums in a revolving annular stream, a series of plates spaced from one another and from the periphery of said chamber and against which plates the grain is directed and deflected and the surface water thrown off, the space between said plates and the periphery of said chamber communicating with said gutters and having a waste discharge opening, and means for creating currents of air between said plates.

10. The combination, with the revolving strainer drums between which the grain is fed and revolved at a high speed, of a stationary casing having a chamber arranged to receive the grain in an annular stream from said drums, means located in said chamber and against which the stream of grain is directed, and revolving beaters provided in said chamber and arranged to sweep past said means and moving at substantially the same speed as the stream of grain, whereby scouring is prevented.

11. The combination, with the revolving strainer drums between which the grain is fed and revolved at a high speed, of a stationary casing having a chamber arranged to receive the grain in an annular stream from said drums, means extending only partially across said chamber and against which the stream of grain is directed and deflected, and beaters arranged to sweep past said means and moving at substantially the same speed as the stream of grain, substantially as described.

12. The combination, with a revolving drum from the end of which the grain is discharged in an annular stream, of a stationary casing having a chamber to receive the grain, a series of plates spaced from one another and from the periphery of said chamber and against which plates the grain is directed and deflected, and the surface water thrown off the space between said plates and the periphery of said chamber having a waste discharge opening, and means for creating currents of air between said plates, substantially as described.

13. The combination, with the revolving strainer drums between which the grain is fed and revolved at a high speed, of a stationary casing having a chamber arranged to receive the grain in an annular stream from said drums, a series of plates mounted in said chamber and spaced from one another and against which plates the grain is directed and deflected and the surface water thrown off, and means for creating currents of air between said plates, for the purpose specified.

14. The combination, with a revolving drum having an open end operating in a vertical plane and from which the grain is discharged in an annular stream, of a stationary casing located near the end of said drum and having a peripheral chamber to receive the grain, and a series of stationary plates spaced from one another and from the periphery of said chamber and extending around through the said chamber and against which plates the annular stream of grain is directed and deflected, and the surface water thrown off, substantially as described.

In witness whereof, I have hereunto set my hand this 17th day of October, 1906.

JAMES McDANIEL.

Witnesses:

RICHARD PAUL,
J. B. ERA.