

(No Model.)

3 Sheets—Sheet 1.

J. JESSEN.

FIRST BREAK MACHINE FOR THE REDUCTION OF WHEAT.

No. 362,582.

Patented May 10, 1887.

Fig. 1.

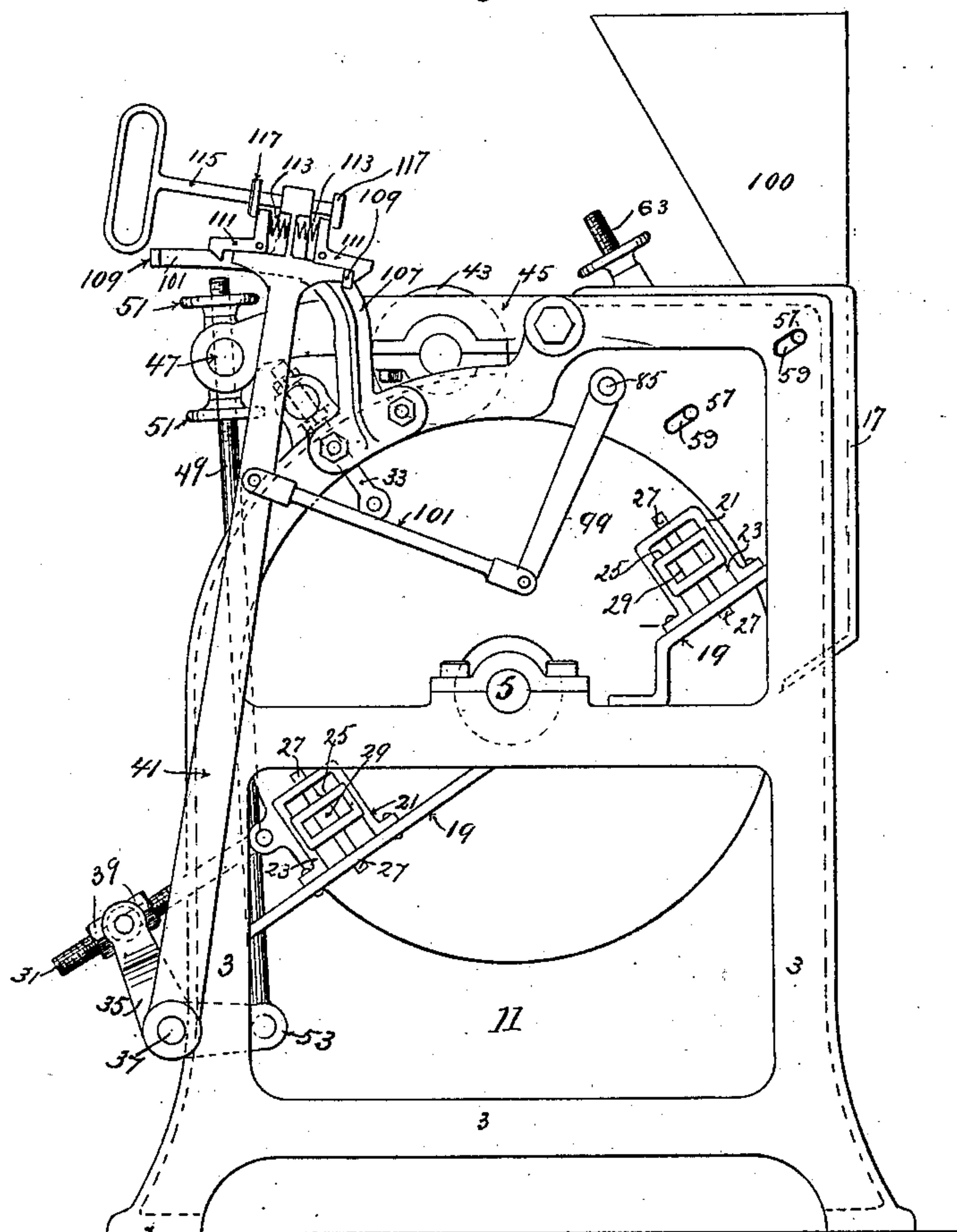


Fig. 4.

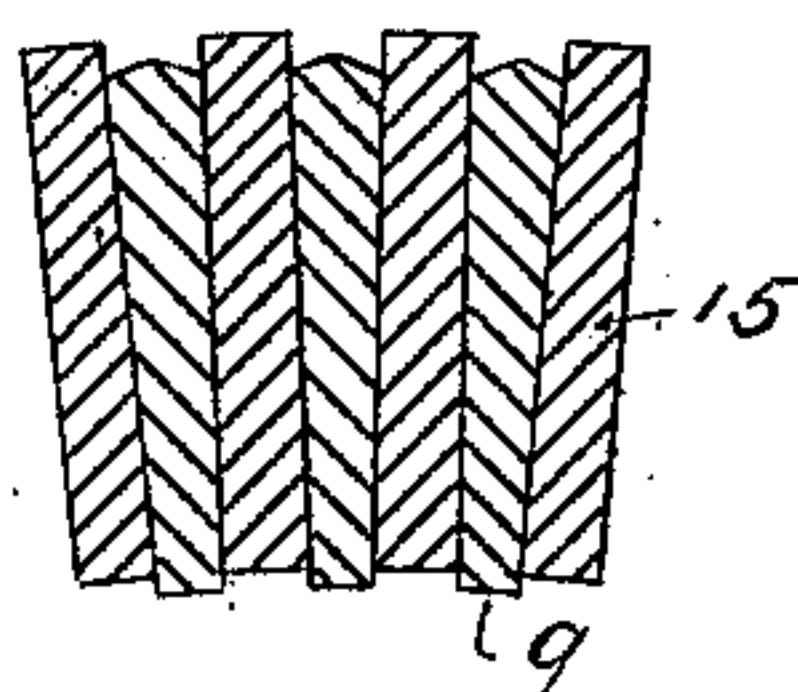


Fig. 6.

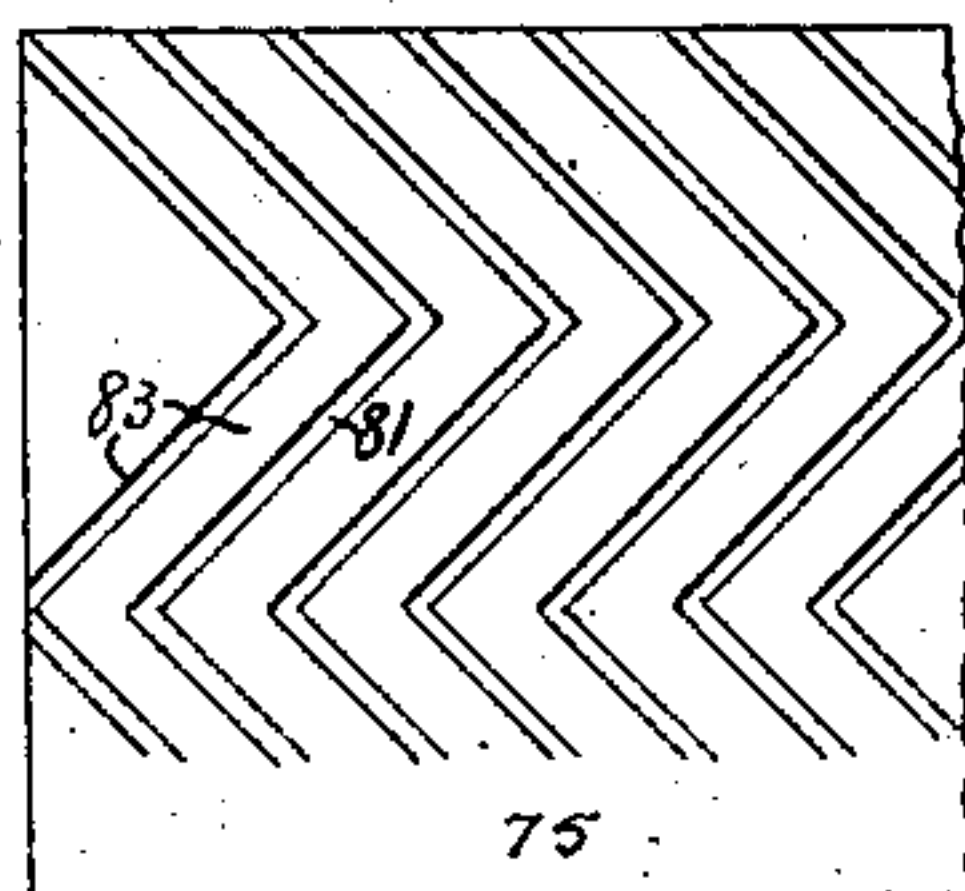
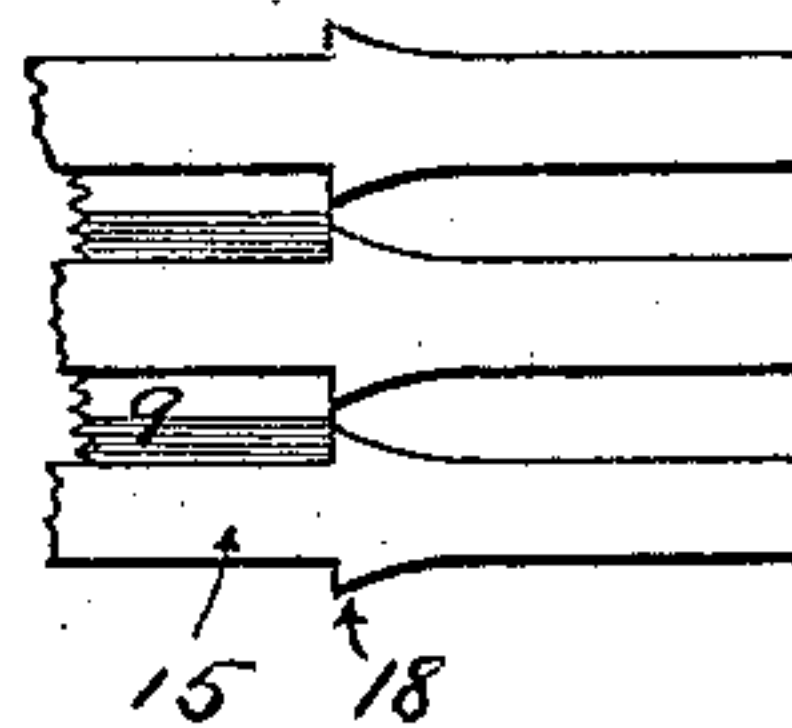


Fig. 5.



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Fig. 3.

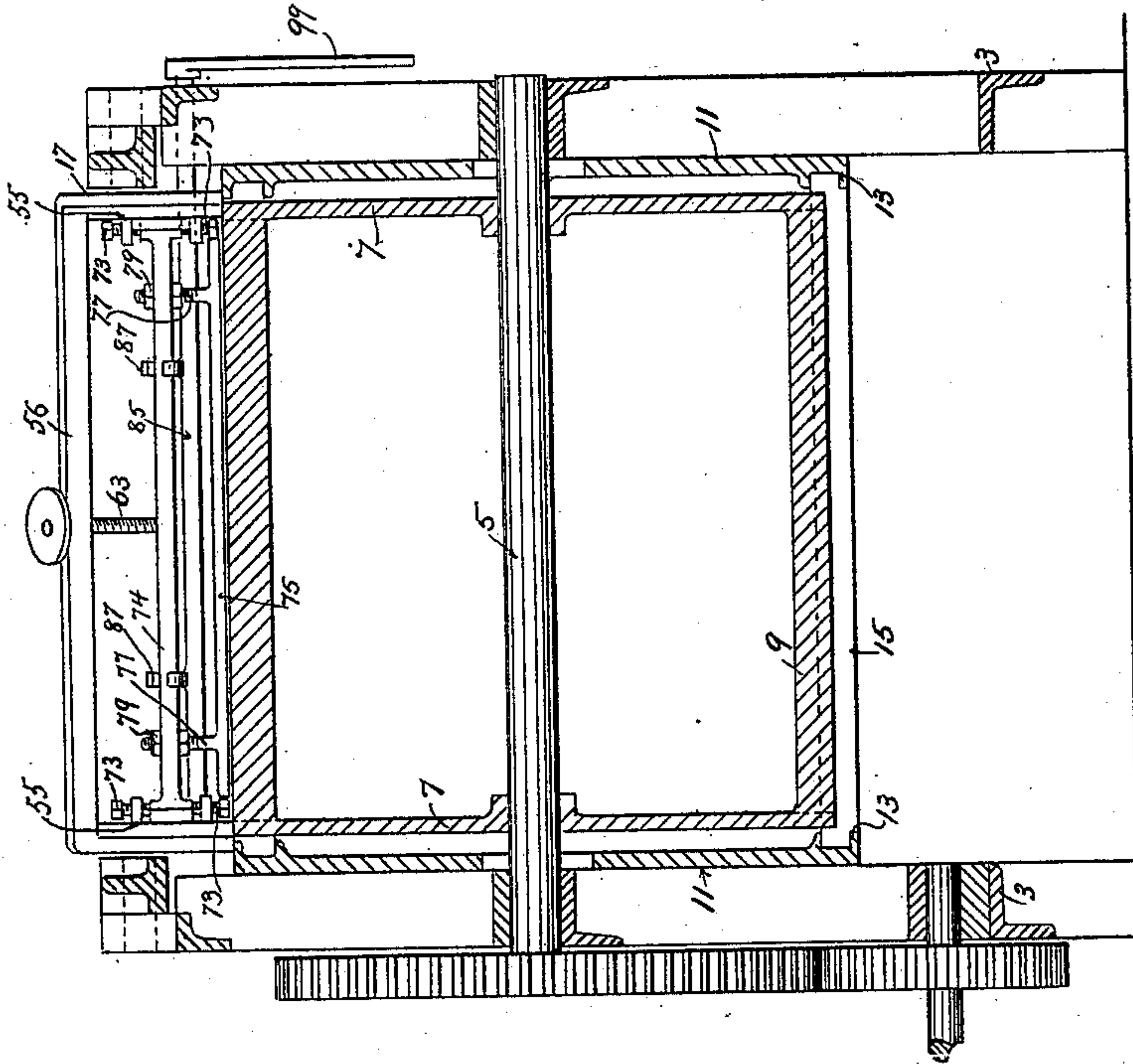
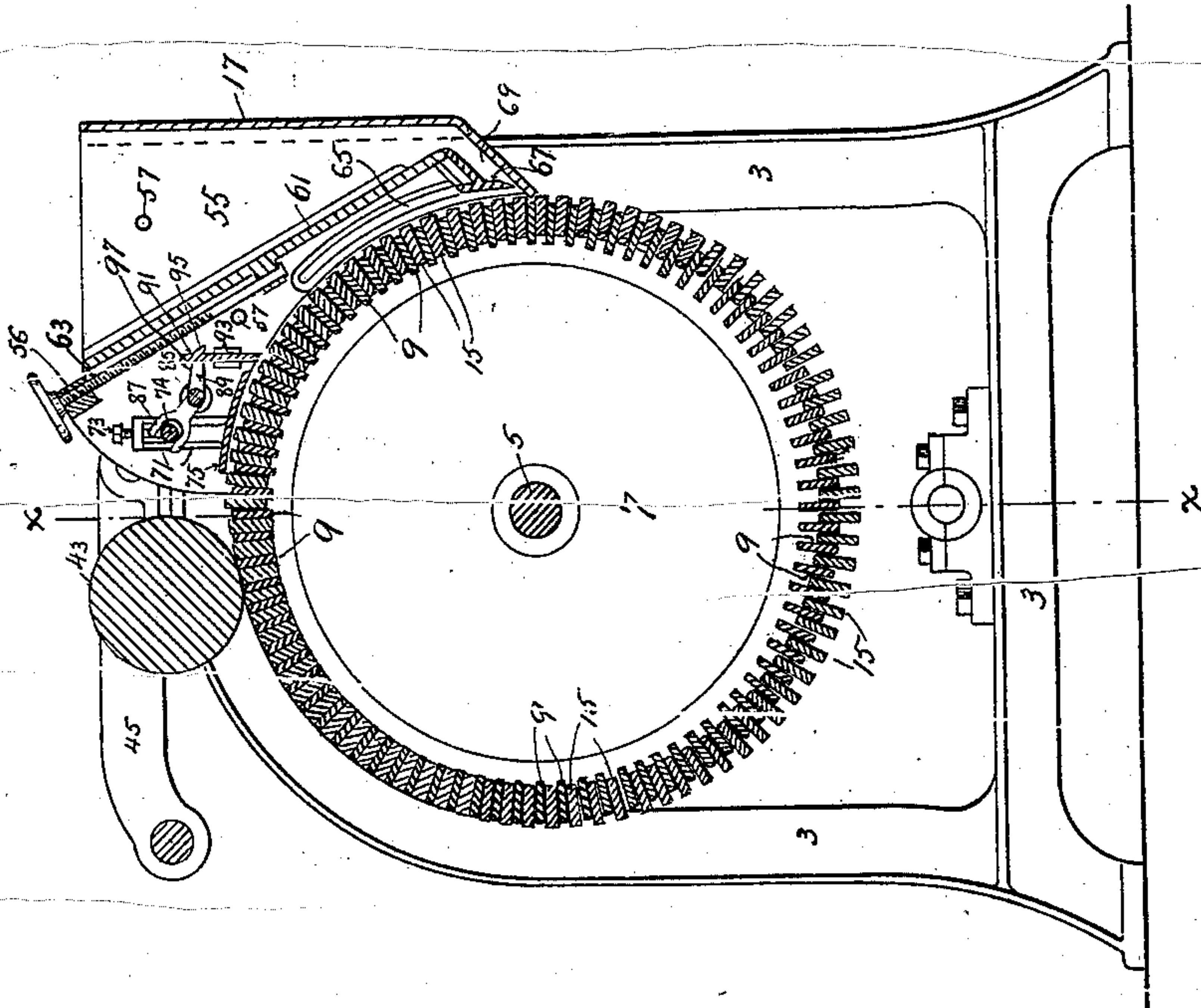


Fig. 2.



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Fig. 7.

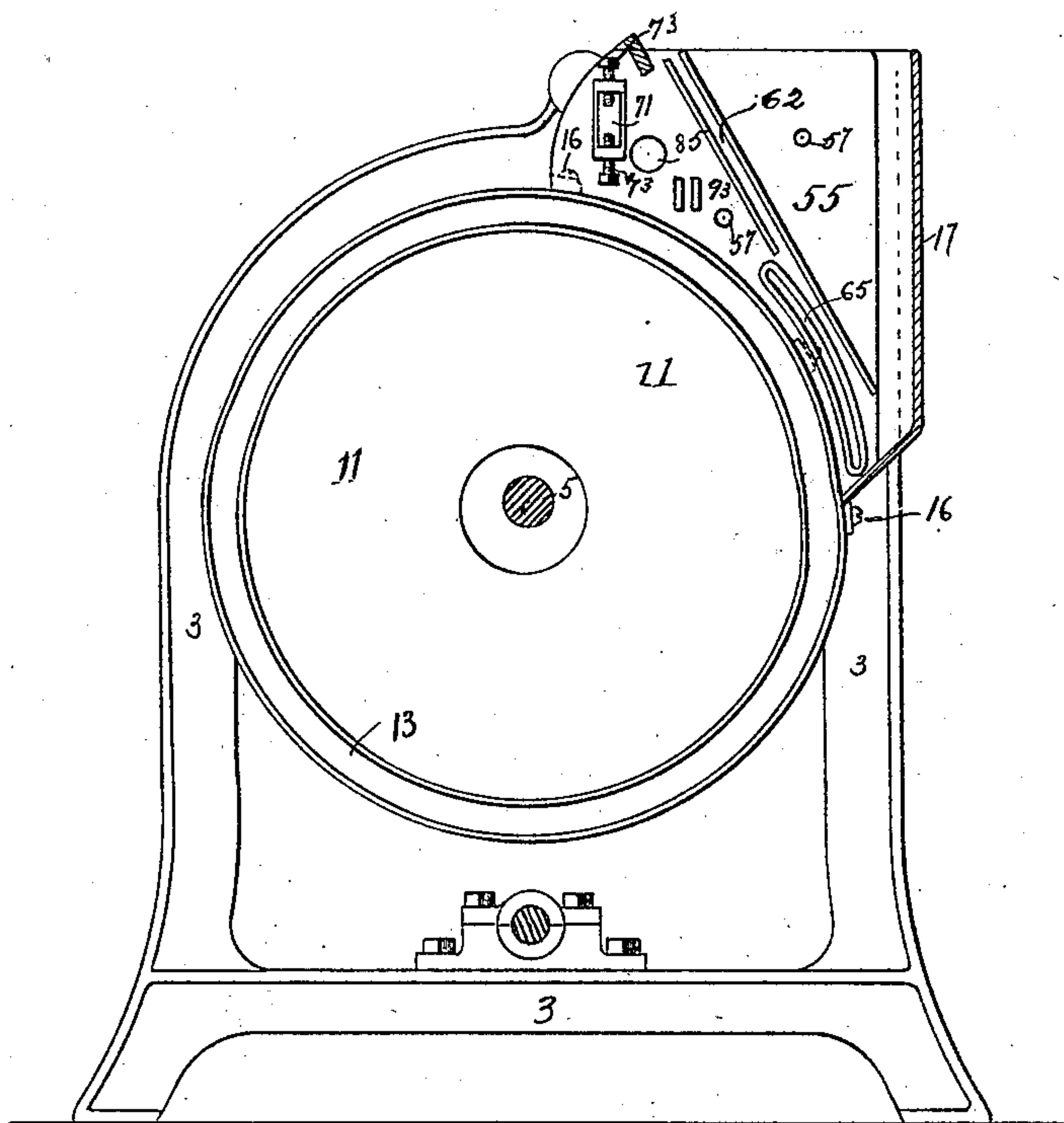


Fig. 8.

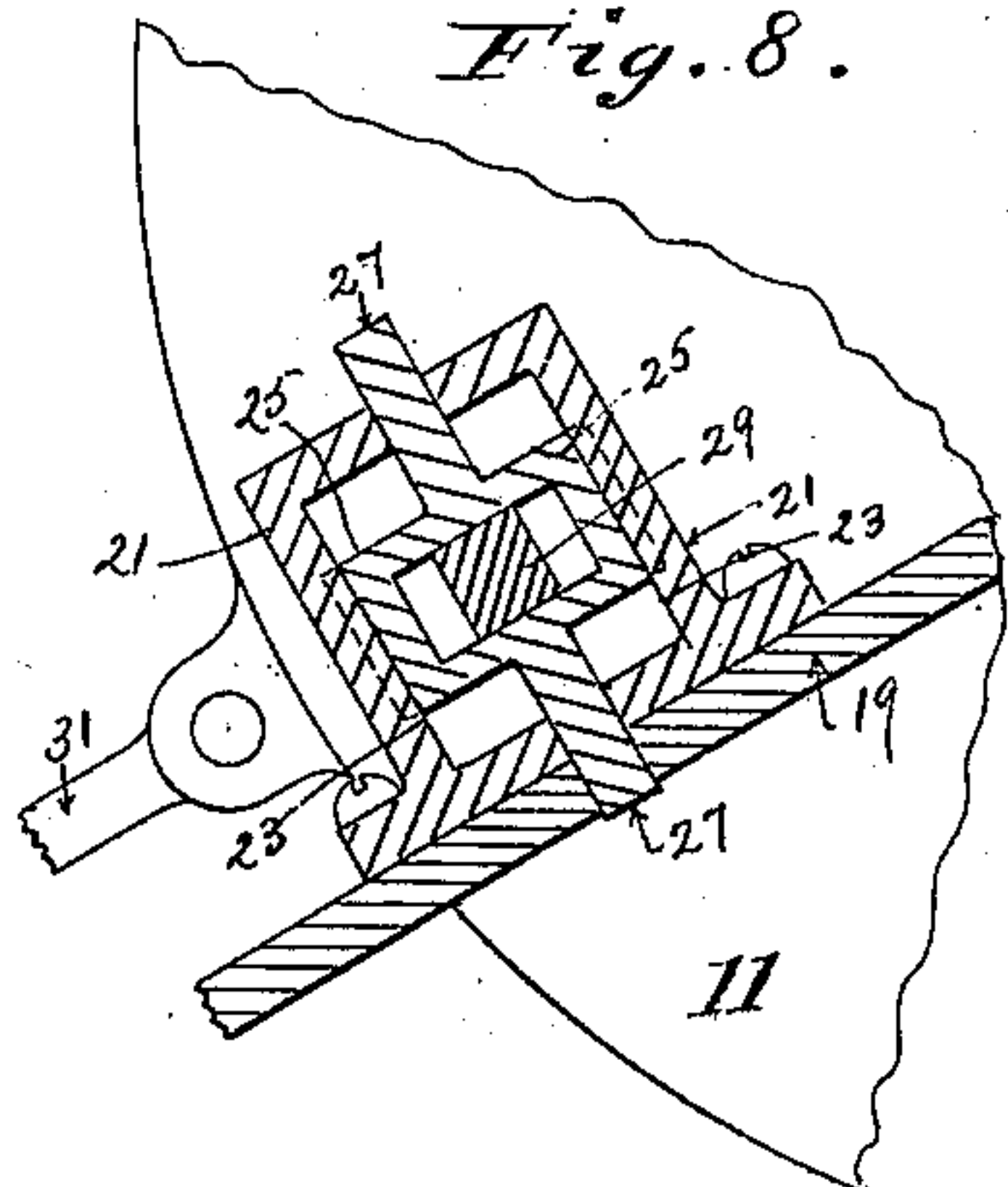


Fig. 9.

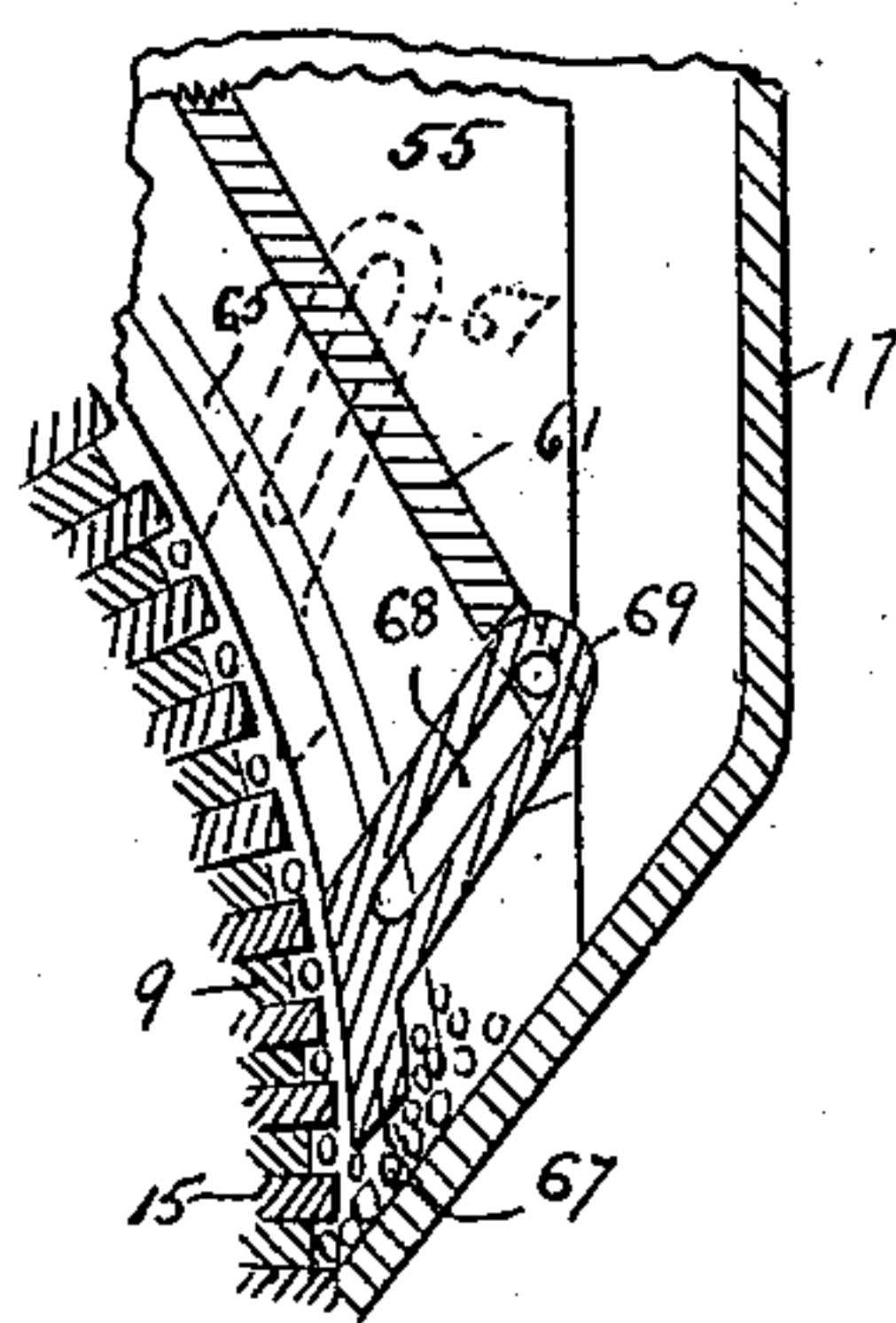
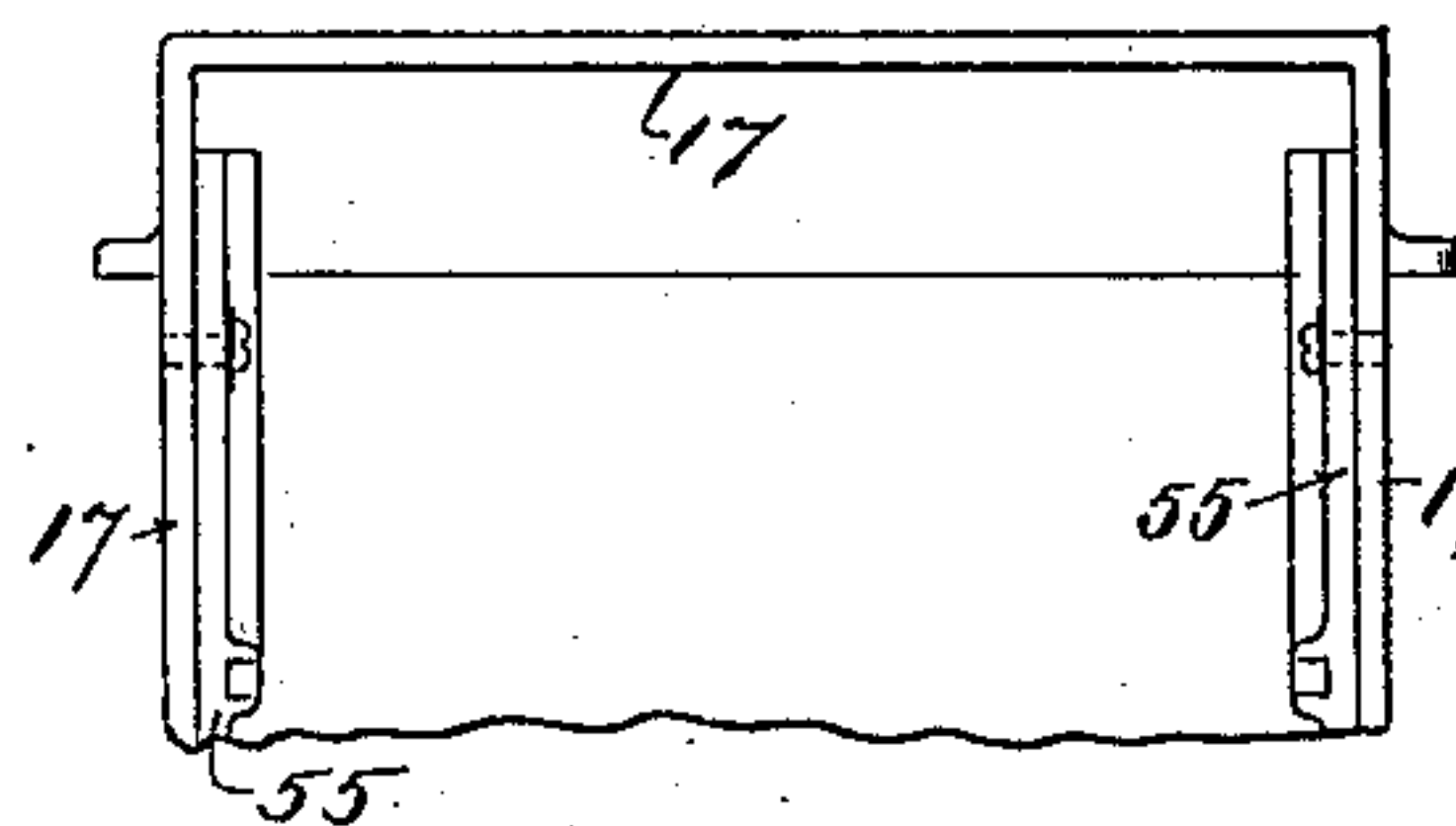


Fig. 10.



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UNITED STATES PATENT OFFICE.

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FIRST-BREAK MACHINE FOR THE REDUCTION OF WHEAT.

SPECIFICATION forming part of Letters Patent No. 362,582, dated May 10, 1887.

Application filed April 23, 1886. Serial No. 199,919. (No model.)

To all whom it may concern:

Be it known that I, JAMES JESSEN, of Minneapolis, in the county of Hennepin, State of Minnesota, have invented certain Improvements in First-Break Machines for the Reduction of Wheat, of which the following is a specification.

My invention relates to improvements in machines for splitting wheat lengthwise through the crease in the berry, so that the crease-dirt and germ may be removed prior to the further reduction of the wheat in the process of making flour.

The invention consists, generally, in the construction and combination of parts hereinafter described, and pointed out in the claims.

Figure 1 is an end elevation of a machine constructed in accordance with my invention. Fig. 2 is a transverse vertical section of the same. Fig. 3 is a section on line X X of Fig. 2. Figs. 4, 5, and 6 are details. Fig. 7 is an inside view of the frame of the machine, showing the groove in one of the heads, and with the hopper partly in section. Fig. 8 is a detail view showing the means for supporting the heads upon the frame of the machine. Fig. 9 is a detail of a portion of the hopper, cylinder, and slide. Fig. 10 is a detail plan of a portion of the hopper.

In the drawings, 3 represents the frame of the machine, which may be of any suitable construction.

5 is the main shaft of the machine, mounted on suitable boxes on the frame thereof, and rotated by any suitable means.

Secured to the shaft, near each end thereof, and inside of the frame, are the disks 7, around the edges of which are secured a series of flat metal bars, 9, on their edges, with narrow spaces between them, forming a cylinder. The outer edges of the bars 9 are preferably beveled off in each direction, leaving a sharp edge, as shown in Fig. 4. The thickness of the bars 9 is nearly the same as that of an ordinary wheat-berry, and may be varied for different sizes of wheat. The machine may be double, and two cylinders having different sizes of bars may be provided in the same machine. By grading the wheat the large sizes may be run onto one cylinder and the small ones onto the other.

43 represents a roll, preferably of small di-

ameter, either smooth or corrugated, which is placed on the top of the cylinder, not directly over the center thereof, but a little toward the rear of the machine, as shown in Fig. 1. The cylinder is of large diameter, and revolves slowly.

Heads 11, having upon their inner faces somewhat irregular grooves or channels 13, are adjustably supported upon the frame of the machine between each end of the cylinder and the inner side of the frame. The openings in the heads 11, through which the main shaft 5 passes, are sufficiently large to admit of the heads being moved in any direction in a vertical plane. A series of metal bars, 15, are arranged between the bars 9 in the cylinder, with their ends in the grooves 13. The ends of the bars 15 are provided with shoulders 18, that project over the ends of the bars 9 and close the ends of the spaces between the bars 15, where they are projected beyond the bars 9.

The grooves 13 on the inner faces of the heads 11 are made as follows: Beginning at a point a little below the mouth of the hopper and extending to a point that is directly over the main shaft, the grooves are each in the form of an arc of a circle, and their relation to the bars 9 is such as to cause the outer edges of the bars 15 to project about the thickness of an ordinary wheat-kernel beyond the outer edges of the fixed bars 9. From the point that is directly over the shaft of the cylinder to the point beyond the roll that is about on a horizontal line with the shaft, the grooves 13 in the heads extend inward toward the center, and at the point immediately underneath the roll their position causes the bars 15 to be very nearly flush with the bars 9, thereby forming only very slight grooves in the surface of the cylinder, of just sufficient depth to keep the wheat in its position on the bars 9 while being subjected to the action of the roll, and at the same time enabling the roll to split it without coming in contact with the cylinder. The heads 11 being adjustable either way, as hereinafter described, the depth of the grooves in the cylinder, and to some extent, also, their width, may be regulated at any time at the point under the roll, or under the hopper where the wheat is received, as may be desired, to obtain the best results. As the bars 15 move in radial lines, the distance between their

outer edges will be greater as they are projected farther from the center, and hence the width of the grooves at the top, as well as their depth, will depend upon the extent to which the bars 15 are projected. By having the wheat graded the grooves may be varied for different sizes, which will enable the machine to do its work more perfectly. After passing the roll the bars 15 are further retracted slightly, making them flush with the bars 9, (or the sharp edges of the bars 9 may project slightly beyond the bars 15 at this point,) so that the split wheat is discharged from the cylinder and the grooves are thereby cleaned. From the point about horizontal with the center of the cylinder to the bottom thereof, the grooves 13 gradually extend outward, so as to cause the bars 15 to project considerably beyond the bars 9 at the bottom of the cylinder, thereby forming small spaces between the bars 9 and 15. Any material that might in any way work into the interior of the cylinder will pass out through these spaces. From the bottom of the cylinder to the point of beginning, a little below the bottom of the hopper 17, the grooves 13 extend slightly inward to their original position. The grooves in each of the heads are exactly similar. As the shaft rotates, the bars 15 are carried around with the bars 9, and, as their ends slide in the corresponding grooves, 13, in the heads 11, they have a radial movement between the bars 9.

A hopper, 17, is arranged to discharge the wheat against the surface of the bars 9 and 15. The under edges of the side walls of this hopper are curved to fit the edges of the heads 11, to which they are secured, resting with one-half of their thickness projecting over and following close to, but without touching, the bars 15. The walls of the hopper 17 extend from the point that is directly over the center of the cylinder to the point that is opposite the center on a horizontal line. The under side or bottom of the hopper 17 is inclined toward the cylinder, as shown in Figs. 2 and 7, and the inner edge thereof follows close to the outer edges of the bars 15, from one end of the cylinder to the other, without coming in contact with them. The hopper 17 is secured to the said heads 11 by screws 16, and moves with them, with its sides and bottom near the surface of the bars 15, and, in connection with the shoulders on the ends of the bars 15, prevents any grain from passing out from under its sides and bottom.

At the point where the cylinder passes underneath the hopper where the wheat is discharged against its surface the bars 15 are projected a certain distance beyond the bars 9, thereby forming spaces or grooves in the surface of the cylinder, the bottoms of which are formed by the sharp-edged bars 9. As wheat-berries are always in some degree longer than the thickness thereof, by regulating the depth and width of said grooves and making them nearly the same as the thickness of the

berries which it is desired to split, they will receive only one row of kernels in each groove, and these kernels will lie therein with their ends all pointing toward the ends of the cylinder, and, as the cylinder is slowly rotated, the kernels are given ample opportunity to drop into the grooves. Any kernels which might chance to stand upright in the grooves will be turned down on passing beneath an inclined grooved-plate, as hereinafter described.

The capacity of the machine may be varied by the length of the cylinder or the number of grooves therein.

The means for supporting and adjusting the heads 11 are preferably as follows: The frame 3 is provided at each end of the machine with the inclined bars 19, upon which the rectangular boxes 21 are secured. These boxes are provided with ways 23, upon which slide rectangular boxes 25, having guide-pins 27. The length of the rectangular openings is at right angles to the ways 23, and is also parallel with a line drawn from a point a little below the center of the hopper 17 toward the main shaft 5. The heads 11 are provided with the rectangular projections 29, that fit within and are adapted to move in the rectangular boxes 25. Threaded rods 31 are pivoted to the edges of the heads 11, and pass through pivoted blocks on the arms 35, which are secured to the shaft 37. The threaded rods 31 are provided on each side of the swiveled or pivoted blocks with adjusting-nuts 39. The shaft 37 is held in boxes secured to the frame of the machine, and is provided with a hand-lever 41.

Substantially at right angles to the rods 31 on both sides of the machine are the similar rods, 33, pivoted likewise to the heads 11. The rods 33 pass through pivoted blocks secured to the frame on each side of the machine, and are also provided with adjustable nuts on each side of said blocks. By means of the threaded rods 31, with adjusting-nuts 39, the heads 11 may be adjusted by moving the heads toward or from the hopper to regulate the depth of the grooves in the cylinder at the point opposite the hopper where the wheat is received, and by means of the threaded rods 33 the relative position of the bars 15 and 9 immediately under the roll may be adjusted with accuracy by moving the heads toward or from the roll. The grooves at this point just under the roll should be only deep enough to keep the wheat in place, and their depth should be varied to suit the size of the wheat, being slightly deeper for large wheat than for small. The roll 43 is mounted in boxes in swinging arms 45, that are pivoted to the frame of the machine. The rear ends of the arms each carry a swiveled block, 47, that is held on a rod, 49, by adjusting-nuts 51. The rod 49 is joined to a crank-arm, 53, on the shaft 37, and when this shaft is turned on its axis the roll is either raised or lowered.

The hopper 17 is provided within its side walls with plates 55, having each two guide-bolts, 57, that pass through oblong slots 59 in

the side walls of the hopper 17. A line drawn from one of the slots 59 to the other is substantially parallel with a line from a point a little below the center of the hopper toward the center of the cylinder, thus permitting the hopper 17 to move with the heads 11, while the plates may remain stationary, as herein-after described. The plates 55 are provided upon their inner sides with a slide, 61, that forms the inner wall of the hopper, and slides in an inclined groove, 62, on the inner side of each one of the plates 55.

The plates 55 are also provided with curved grooves 65, that follow the course of the cylinder at equal distances therefrom, and in which is held a curved slide, 67. A plate, 69, having at each end a slot, 68, is secured to or formed integral with the upper edge of the curved slide 67, and is hinged to the lower edge of the straight slide 61 by pins which engage the slots 68. These slots permit the curved slide 67 to move toward or from the under edge of the slide 61 as it is raised or lowered, as shown in the detail view, Fig. 9. The plates 55 are connected on their upper edges near the slide 61 by a rod, 56, and a regulating-screw, 63, passes through rod 56 and is connected with the slide 61. By means of the screw 63 the slide 61, the plate 69, and the curved slide may be raised or lowered, thereby increasing or diminishing the space opposite the surface of the cylinder, where the wheat is permitted to fall into the grooves between the bars 15, thus regulating the amount of grain carried by the cylinder. The plates 55 are provided with ways 71 and set-screws 73. A bar, 74, has its ends inserted in the ways 71, and is secured adjustably therein by set-screws 73. A curved plate, 75, is supported from the bar 74 by means of the threaded rods 77, and provided with adjusting-nuts 79, as shown in Fig. 3.

The under surface of the plate 75 is provided with a series of zigzag grooves, 81, formed by securing thereto or forming thereon the strips 83. These strips gradually diminish in height and vanish near the edge of the plate that is toward the roll.

The grooved plate 75 is adjusted by means of the threaded rods 77, passing through the bars 74, which rods are provided with the adjusting-nuts 79. This plate is held at a short distance from the surface of the cylinder, and serves to turn down lengthwise in the grooves any kernels that stand upright and project beyond the edges of the bars 15.

A stationary hopper, 100, is secured to the frame of the machine and extends down in the hopper 17, with enough space between it and the walls of the hopper to permit the hopper 17 to be moved.

A shaft, 85, is mounted in the side walls of hopper 17 and extends through holes in the plates 55, said holes being large enough to permit it to move with the hopper 17. The shaft 85 is provided near each end, inside the hopper-walls, with an arm, 87, having a forked

end that embraces the bar 74, also with an arm, 89, that projects therefrom in the opposite direction. A slide, 91, moves in vertical ways 93 in the inner sides of the plates 55. It is provided with projections 97, which are engaged by, but not joined to, the arms 89 on shaft 85. The upward movement of the arms 89 raises the slide 91, and a downward movement of said arms allows it to slide down by its own weight.

The slide 91 is also provided with projections 95, near each end, that engage the tops of the ways 93 in the sides of the plates 55 and prevent the slide from coming in engagement with the cylinder when it is lowered. The curved slide 67 and the under edges of the plates 55 are adjusted so as to be a little distance away from the cylinder, enough to permit any kernels projecting with their ends over the bars 15 to pass under without being crushed and to enter the zigzag inclined grooves in plate 75, by which they are turned down in the grooves, as already described.

The distance of the under edges of plates 55 and of the curved slide 67 from the cylinder may be regulated by means of the set-screws 73, which engage the bar 74. The bar being held stationary, if the screws are adjusted the plates 55 and the parts carried by them will be raised or lowered a short distance, and the direction of the slots 59 will cause them to move toward or from the cylinder. The shaft 85 has on its end, outside the hopper 17, an arm, 99, that is connected by a rod, 101, with the hand-lever 41.

An arm, 107, is secured upon the frame of the machine, and is provided with two projections, 109. The upper part of lever 41 is provided with the pivoted dogs 111, which are adapted to engage the projections 109. Springs 113 tend to throw the hook ends of the dogs downward. A rod, 115, having collars 117, passes through the lever and slides therein. The collars 117 are in position to engage the ends of the dogs and raise them from the projections. When the parts are in the position shown in Fig. 1, the machine is in position for operation. By drawing out the rod 115 the dog that is engaged with the projection 109 is raised. A further movement of the rod carries the lever over until it strikes the other projection 109, and the other dog engages this projection and holds the lever in this position.

The operation of the machine is as follows: The wheat is fed from the stationary hopper 100 on the frame of the machine into the hopper 17, and passes thence to the cylinder. The grooves in the cylinder being at this point of about the same depth and width as the thickness of the wheat-berry, the wheat is received lengthwise in the grooves with the ends of the kernels pointing toward the ends of the bars. Should any of the kernels chance to point outward from the cylinder, their ends will project beyond the bars 15, and on entering the zigzag inclined grooves in plate 75 the strips 83, in connection with the inclined under surface of the plate 75, will turn them down in the grooves

lengthwise along the bars 15. The majority of the kernels will naturally fall in the grooves with their creases over the sharp edges of the bars 9, which form the bottoms of the grooves, and a part of them with their backs on said edges. In either case they will be split longitudinally through the crease in the berry when passing under the revolving roll. If any kernel happens to fall with its side downward in the groove, the sharp edge of the bar forming the bottom of the groove will cause it to turn over with its crease over the said edge. The split wheat falls from the cylinder after passing the roll. Any material that might work its way into the interior of the cylinder will pass out through the openings between the bars 15 and 9 at the bottom thereof.

To throw the machine out of operation when it is desired to stop the feed without stopping the machine, the lever 41 is thrown outward from its position shown in Fig. 1, thereby turning the shaft 37 on its axis.

By means of the crank-arms 53 on the shaft 37, and threaded rods 31, connecting crank-arms 35 with heads 11, the heads 11 with the bars 15 and the hopper 17 are drawn downward in a line from a point a little below the center of the hopper 17 toward the center of the cylinder just sufficient to make the bars 15 substantially flush with the bars 9 at the point underneath the hopper where the wheat is discharged against the surface of the cylinder.

The cylinder thereby having a very nearly smooth surface at this point will pass under the wheat without carrying off any thereof.

By means of the rod 101, connecting the lever 41 with the arm 99 on the shaft 85, which is provided with the forked arm 87 and mounted in the hopper 17, the shaft 85 turns slightly on its axis, and the forked arm 87, which embraces the bar 74, that is secured to the plates 55 by set-screws 73, turns upward in the direction of the slots in the side walls of the hopper 17, thereby causing the plates 55, the curved slide 67, the slide 61, and the grooved plate 75 to be held practically stationary while the hopper 17 with the shaft 85 is moving with the heads 11.

The plates and slides do not move with the hopper, as, otherwise, by being drawn inward along with the bars 15, they would strike against the wheat lying on the bars 9 before the bars 9 and 15 should become perfectly flush with each other, thereby making the movement difficult and crushing the wheat between the bars 9 and said plates. The slide 91, supported by the arms on the shaft, is by the same movement allowed to slide down by its own weight. This slide is not for the purpose of cutting off the feed, as the cylinder will then carry no wheat, but is simply to keep any stray kernels back which might possibly be carried up with the revolving cylinder. It is permitted to slide down far enough for this purpose without coming in contact with the cylinder. The reverse movement of the lever 41 throws all the parts back in exactly their

former position, bringing the machine back to operation.

I claim as my invention—

1. A first-break machine for the reduction of wheat, comprising a roll, a cylinder consisting of the disks 7 and the flat sharp-edged bars 9, secured around the edges of said disks with narrow spaces between them, the heads 11, supported adjustably at each end of the cylinder and having on their inner faces the irregular grooves 13, the series of bars 15, fitting into the spaces between the bars 9, with their ends in the grooves 13, and means for revolving said cylinder, whereby the bars 15 are projected beyond the bars 9 at the point where the wheat is received, thereby forming spaces or grooves to receive the wheat, and are retracted while passing under the roll, substantially as described, and for the purpose set forth.

2. In a first-break machine, and in combination with the roll, the cylinder consisting of the disks 7, the fixed sharp-edged bars 9, with narrow spaces between them, the radially-moving bars 15, arranged between the bars 9 and the heads 11, having the irregular grooves 13, in which the ends of the bars 15 are held, substantially as described.

3. The combination, in a first-break machine, with the cylinder having the series of bars 9 with narrow spaces between them, of the bars 15, arranged between the bars 9, the heads 11, having the grooves 13, and means for adjusting said heads, substantially as described.

4. In a first-break machine, and in combination with the roll, the cylinder having the bars 9 and the radially-moving bars 15, the heads 11, with the grooves 13, and the hopper 17, secured to and moving with said heads, substantially as described.

5. The combination, in a first-break machine, with the cylinder having a series of bars 9, with narrow spaces between them, of the radially-moving bars 15, arranged between the bars 9, the heads 11, having the irregular grooves 13, in which the ends of the bars 15 are held, the hopper 17, secured to said heads, the plates 55, supported adjustably within the hopper 17, the slide 61, the curved slide 67, and the plate 69, secured to the curved slide 67 and hinged to the slide 61, substantially as described.

6. The combination, in a first-break machine, with the cylinder having the bars 9, arranged with narrow spaces between them, the heads 11, having the grooves 13, and the bars 15, having the shoulders 18 projecting over the bars 9, for the purpose set forth.

7. The combination, in a first-break machine, with the roll, of the cylinder having the series of bars 9 and the radially-moving bars 15, the heads 11, having the grooves 13, the hopper 17, the plates 55, the curved slide 67, the slide 61, the plate 75, having the zigzag inclined grooves 81, and means for adjusting the distance between said plates and slides and

said cylinder, substantially as described, and for the purpose set forth.

8. The combination, in a first-break machine, with the cylinder and roll, as described, 5 of the hopper 17, the plates 55, secured within said hopper, the grooved plate 75, the slide 91, the shaft 85, and connecting means between said shaft and said plates and slides, whereby as said shaft is rocked the plates 55, the slides 10 61 and 67, and the grooved plate 75 are held stationary while the hopper 17 is moving, substantially as described, and for the purpose set forth.

9. In a first-break machine, and in combination with the cylinder having the bars 9 and 15 radially-moving bars 15, the heads 11, having the grooves 13, the hopper 17, the plates 55, the slides 61, 67, and 91, the grooved plate 75, the shaft 85, the lever 41, and connecting 20 means between said lever and the heads 11, the roll 43, and the shaft 85, whereby as the lever is thrown out from its position when the machine is in operation the heads 11 are moved in a given direction, thereby shutting 25 off the feed of grain to the roll, the roll 43 is raised, and the shaft 85 is rocked, substan-

tially as described, and for the purpose set forth.

10. The combination, in a first-break machine, with the roll and cylinder having the 30 disks 7, the fixed bars 9, arranged with narrow spaces between them, the heads 11, having the irregular grooves 13, and the bars 15, arranged between the bars 9 with their ends in the grooves 13, of the adjusting-lever 41 35 and means for holding it in any fixed position, substantially as described.

11. The combination, in a first-break machine, with the cylinder having the bars 9, of the grooved heads 11, the bars 15, the projec- 40 tions 29 on said heads, the boxes 25, having rectangular openings in which said projections slide, the boxes 21, having ways in which the boxes 25 slide, and the adjusting-rods 31 and 33, substantially at right angles to each other, 45 substantially as described.

In testimony whereof I have hereunto set my hand this 17th day of April, 1886.

JAMES JESSEN.

In presence of—

A. C. PAUL,
R. PAUL.