

(No Model.)

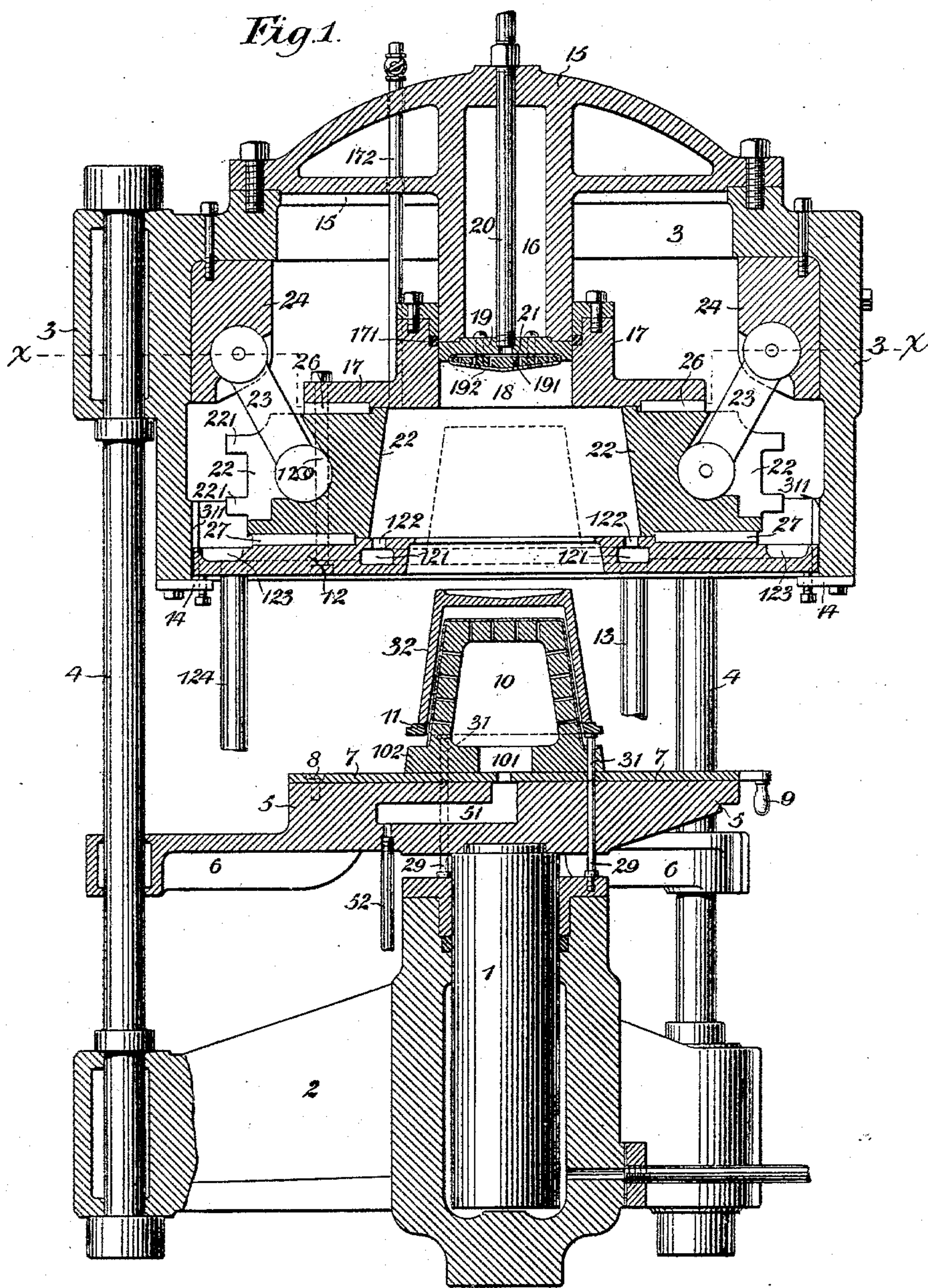
4 Sheets—Sheet 1.

M. L. DEERING.

MACHINE FOR MOLDING HOLLOW WARE FROM PULP.

No. 563,753.

Patented July 14, 1896.



Witnesses  
Edward Thorpe  
C. C. Miller

Inventor  
Mark L. Deering.  
By his Attorney D. A. Carpenter.



(No Model.)

4 Sheets—Sheet 2.

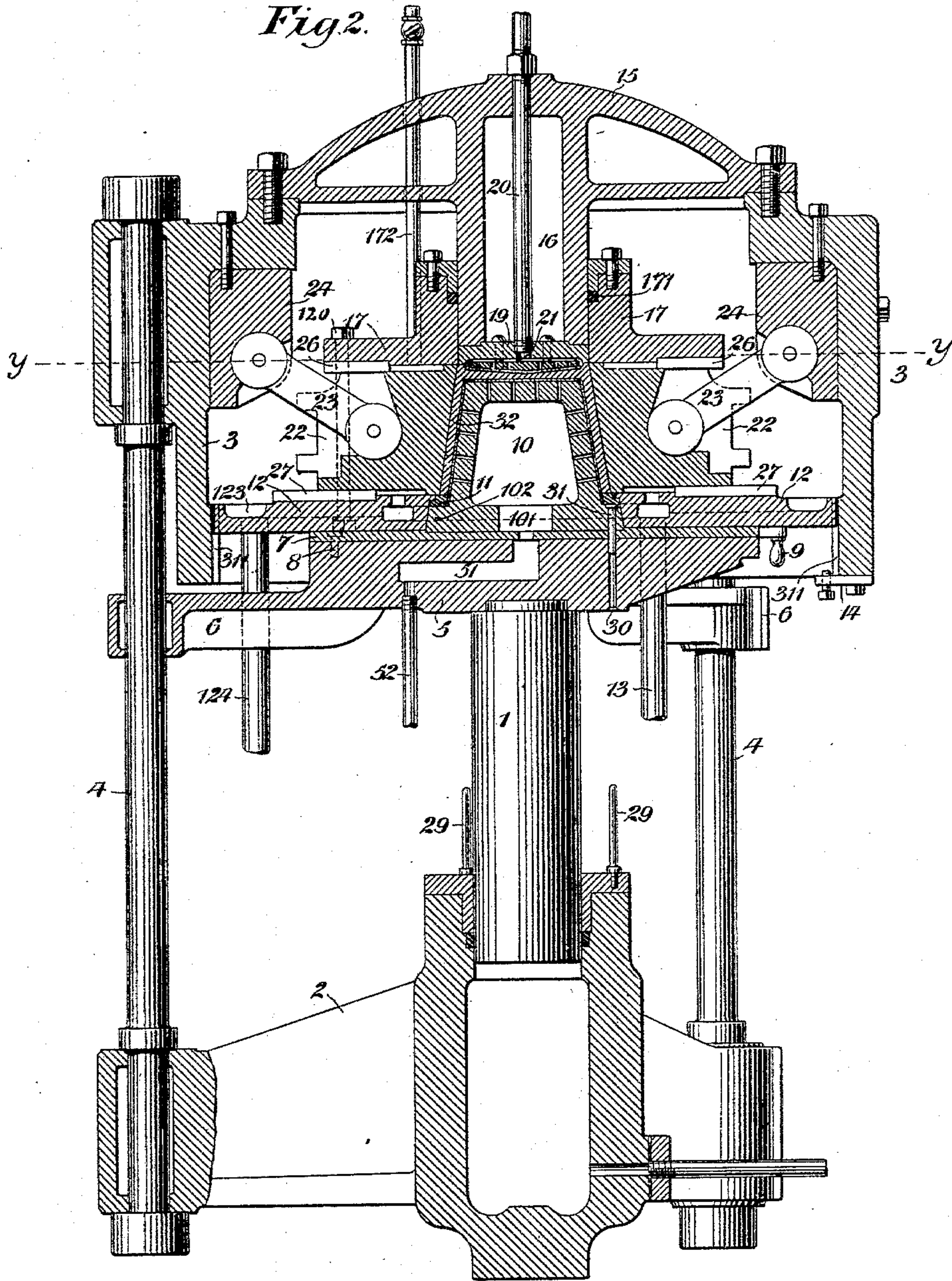
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*Fig 2.*



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(No Model.)

4 Sheets—Sheet 3.

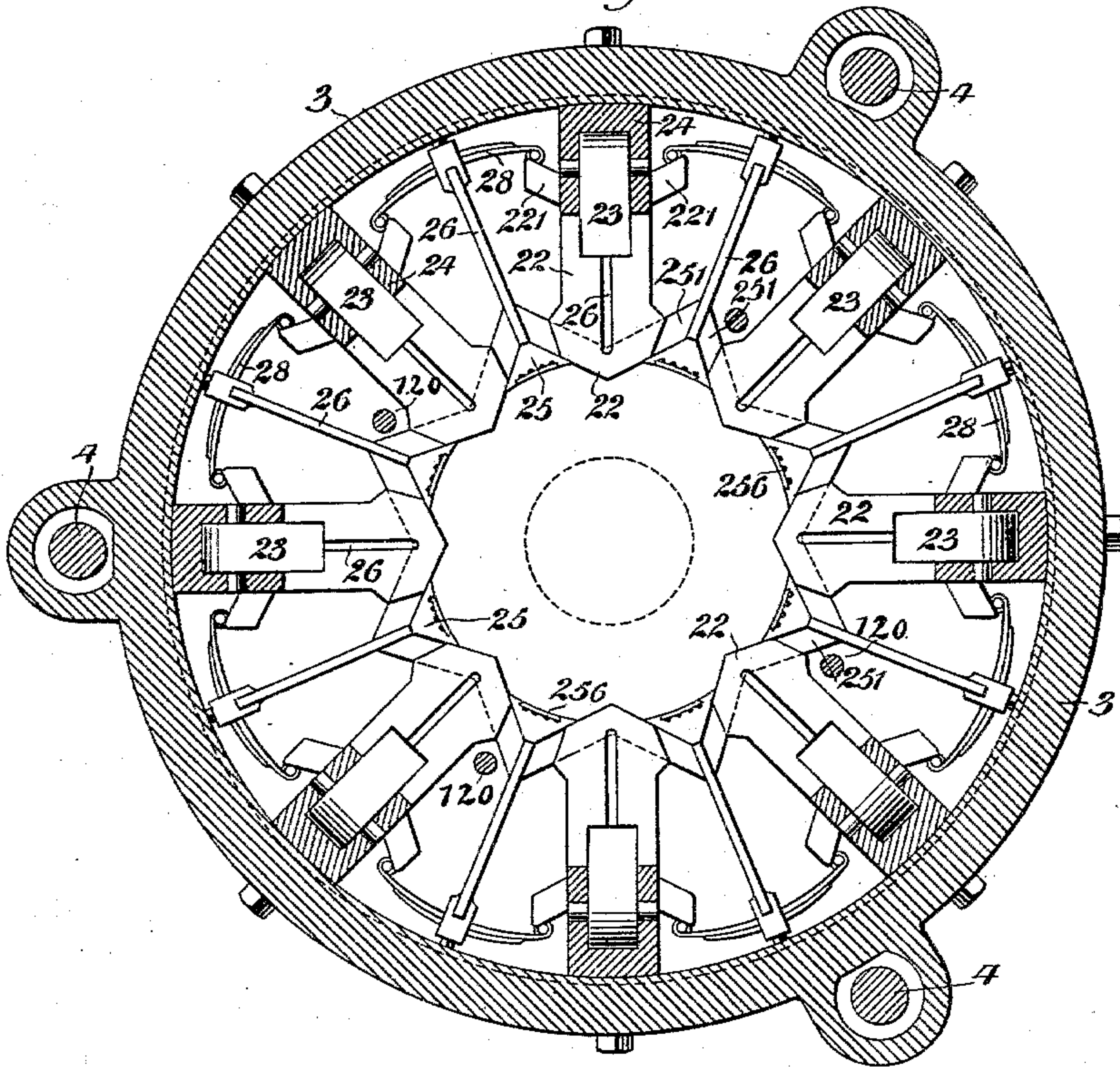
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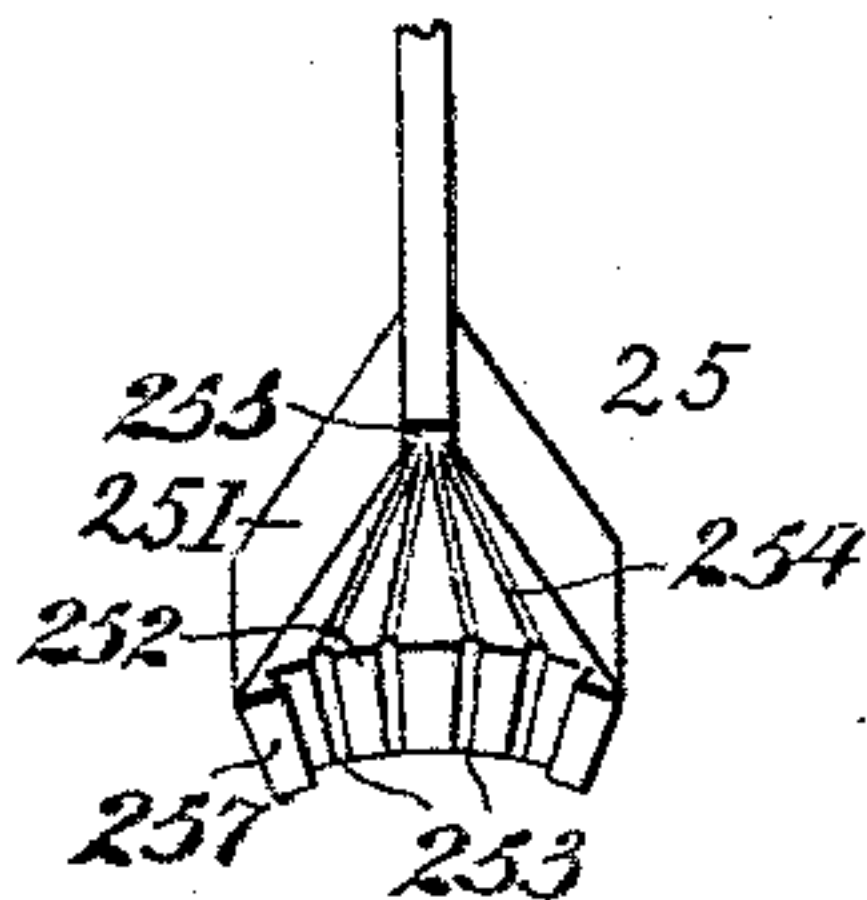
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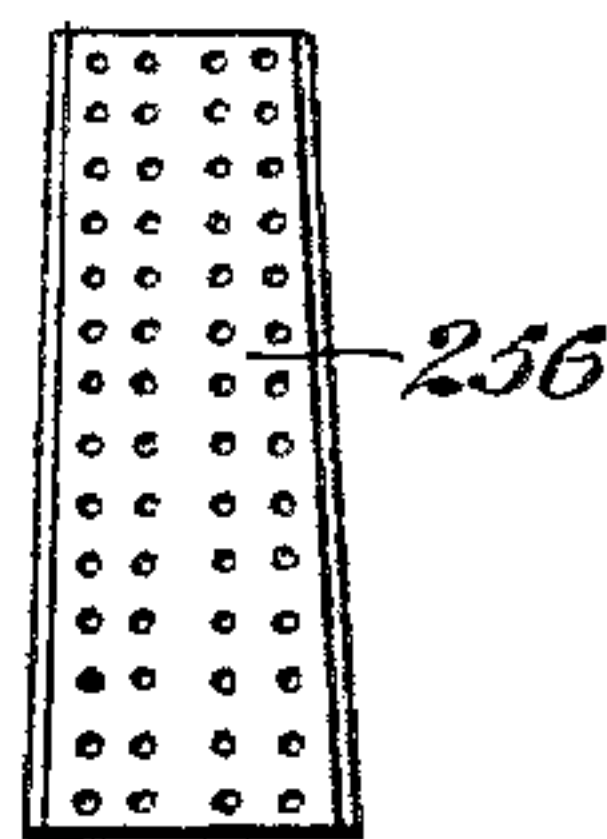
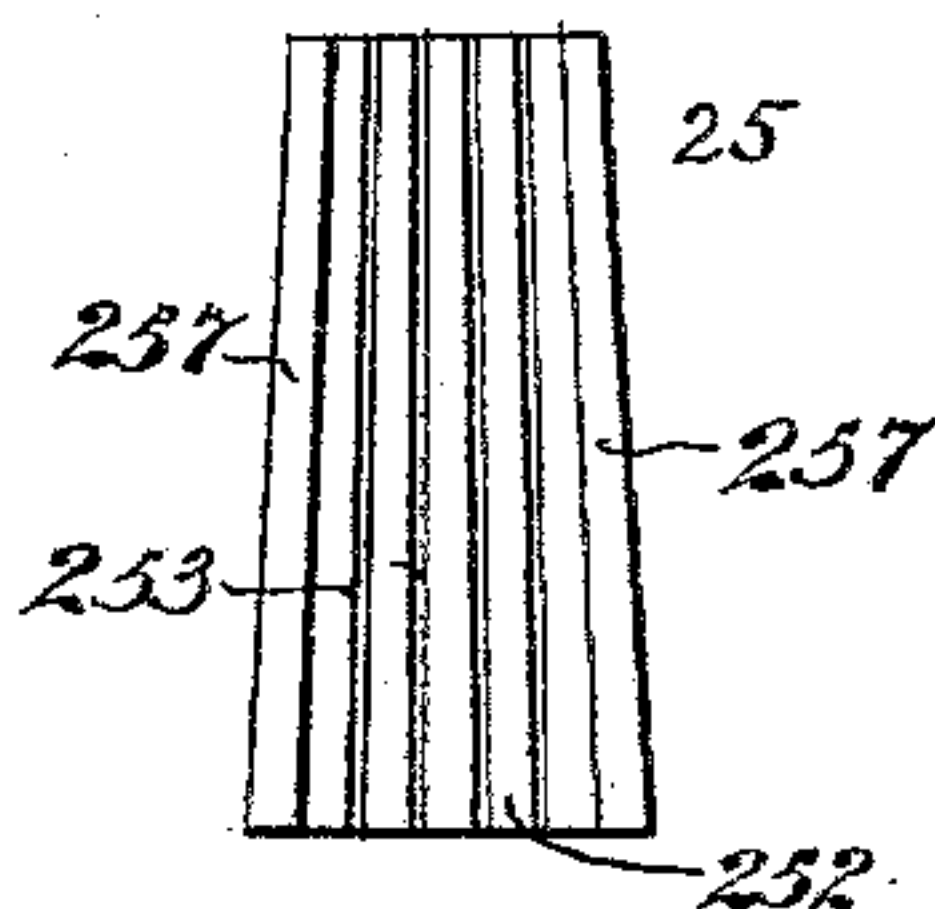
*Fig. 3.*



*Fig. 6.*



*Fig. 7.*



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4 Sheets—Sheet 4.

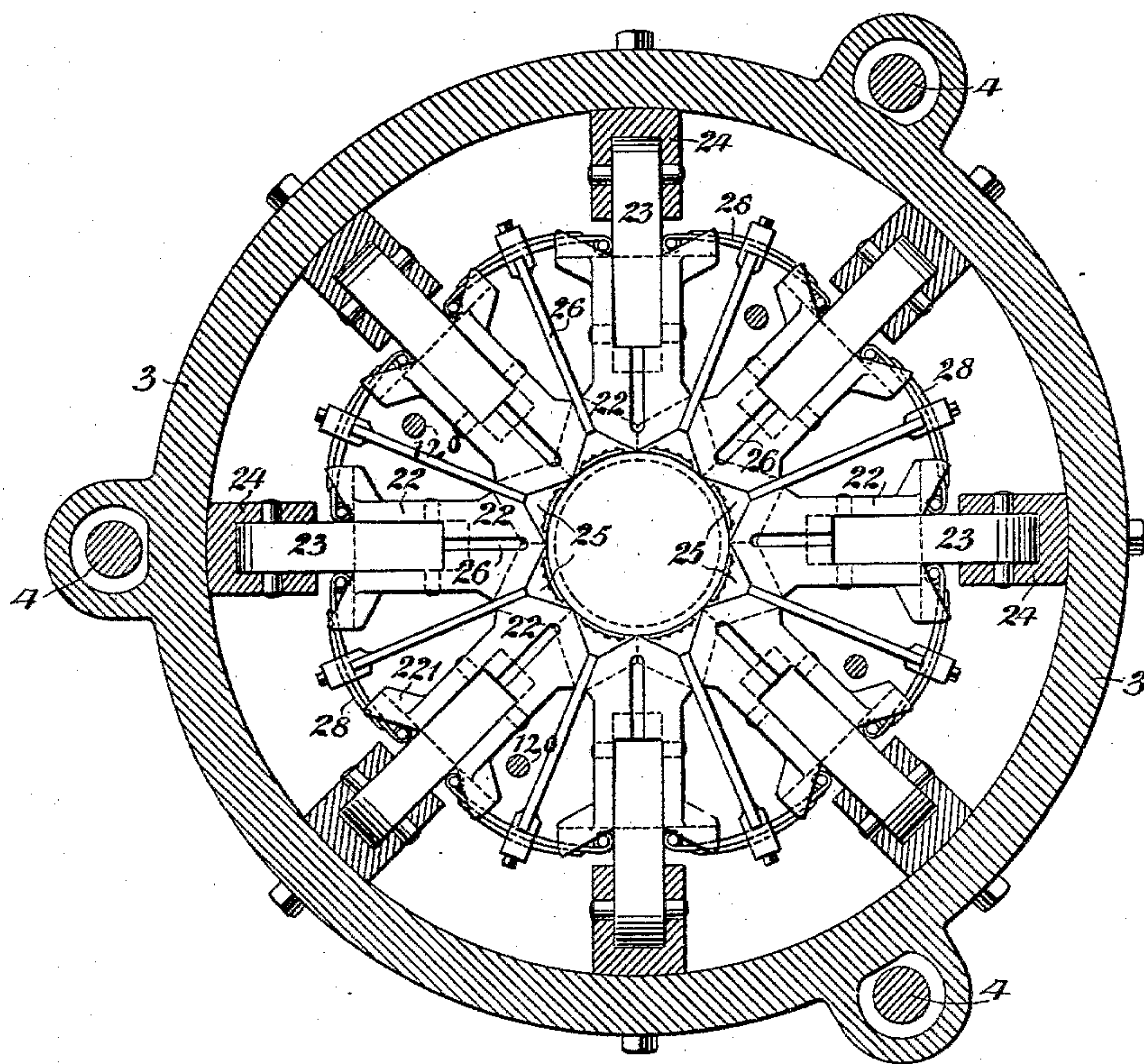
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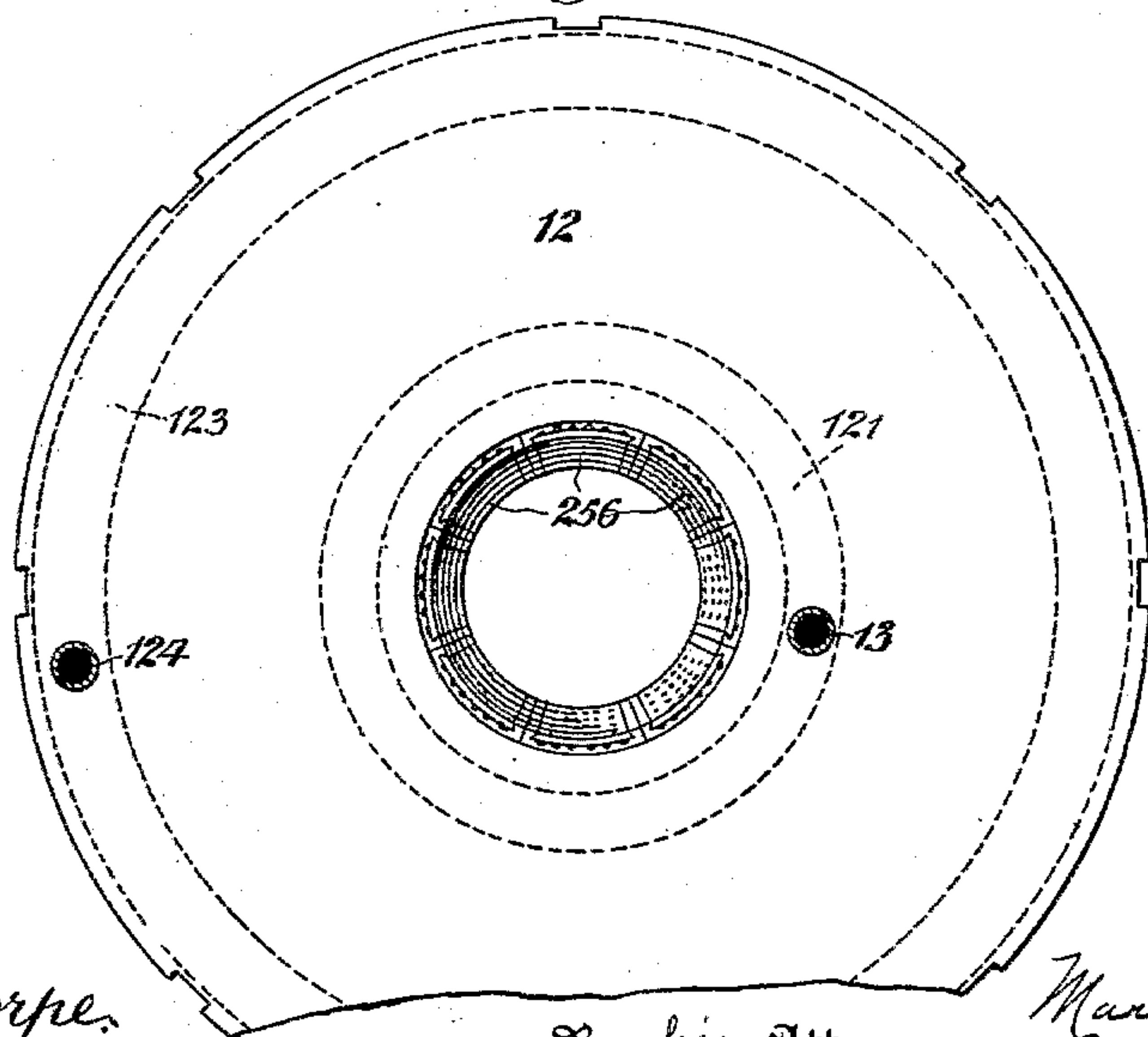
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*Fig. 4.*



*Fig. 5.*



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# UNITED STATES PATENT OFFICE.

MARK L. DEERING, OF BROOKLYN, NEW YORK.

## MACHINE FOR MOLDING HOLLOW WARE FROM PULP.

SPECIFICATION forming part of Letters Patent No. 563,753, dated July 14, 1896.

Application filed February 18, 1893. Serial No. 462,806. (No model.)

*To all whom it may concern:*

Be it known that I, MARK L. DEERING, of Brooklyn, in the county of Kings and State of New York, have invented a certain new and useful Improvement in Machines for Molding Hollow Ware from Pulp, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification.

This invention relates to improvements in pulp-molding machines which are specially designed for molding pails and other similar vessels, and by means of which a seamless vessel is formed; and the invention consists of a pulp-molding machine having substantially the construction herein described, shown, and claimed.

On the accompanying sheets of drawings, Figure 1 is a vertical section of the machine, with the mold open and a pail loose on the former; Fig. 2, a vertical section with the mold contracted and a pail pressed in the mold; Fig. 3, a cross-section and plan in the planes  $xx$ , Fig. 1, showing the parts composing the outer wall of the mold when it is expanded; Fig. 4, a similar view in the planes  $yy$ , Fig. 2, showing the same parts when the mold is contracted; Fig. 5, a view from below the mold when the outer wall is contracted and the former is withdrawn from the space surrounded thereby; Fig. 6, a plan of one of the mold-sections inverted, illustrating means provided for drainage; Fig. 7, a front view of the same and removable facing.

Similar reference-numbers designate like parts in the different views.

The machine herein described is similar in many respects to those patented in Letters Patent No. 455,097, dated June 30, 1891, and No. 541,966, dated July 2, 1895.

The object of the present invention is to obviate the necessity of pressing and removing from the mold a surplus quantity of pulp when a vessel is formed, and to provide better means for the escape of the water through the outer wall of the mold than is shown in either of the machines above designated, and to improve in certain other respects the construction and operation of such machines.

The machine is preferably operated by hydraulic power, which is supplied by the piston

1, contained in the base 2, and adapted to travel upward therefrom toward the hollow casting 3, which is mounted on the columns 4, secured in and supported by the base. On the upper end of the piston is fixed a block 5, through which is a passage 51, and from which extend arms 6, that are provided at their outer ends with boxes adapted to slide on the columns 4. A plate 7 is pivoted near its edge, as shown at 8, on the top of this block or platform, having a handle 9 near the edge opposite the pivot, and on the plate is fastened the hollow former 10, corresponding in shape to the interior of the vessel to be molded, and having grooves in its surface connected by holes with the space inside the former and covered with perforated sheet metal or wiregauze, and also having an outlet 101 for waste water, the same in these respects as formers are ordinarily made. At the base of the former is a flange 102, and on this is a removable ring 11, that fits snugly around the former.

In the bottom of the casting 3 is an annular plate 12, which is movable vertically, and has in its outer edge three grooves, or more if desired, and on the casting 3 is a similar number of ribs 311, which project into the grooves in the plate and furnish narrow bearing-surfaces on which it may slide. The inner edge of this plate conforms to the edges of the flange 102 and ring 11, so that a close joint is made with these by the plate, and the upper surface of the ring and that of the plate lie flush with each other when the former is elevated and the plate 7 is in contact with the plate 12, as shown in Fig. 2. A channel 121 is formed in the plate 12, with an opening in which is inserted a pipe 13, leading into it from below, and with several ports 122 extending from it to the upper face of the plate. Three or four blocks 14 are fastened to the lower edge of the casting 3, and are provided with set-screws which form a stop under the plate 12. This plate is also provided near its outer edge with an open channel 123, with which a pipe 124 is connected.

On the casting 3 is another casting 15, fastened thereto by bolts or screws, and having the hollow hub 16 extending downward from the main part of the casting. A collar 17 is mounted on the hub, being adapted to slide



thereon, and when it is in its lowest position its under surface is below the end of the hub, so that a chamber 18 is formed by the collar and the hub or head, the sides of the opening in the collar forming the lateral wall, and the end of the hub or head the top, of the chamber. A ring of packing 171 is inserted in the collar around the hub, as shown. At the lower end of the hub is a steel plate 19, which is secured to the casting by the bolt 20. This bolt is tubular, so that it may be utilized for another purpose also, as hereinafter explained. The plate 19 has a shallow recess in its under side, and in this is inserted a round plate 191 of steel, which is slightly thicker in the center than at the edge, and which is perforated, and provided with grooves in its under face, and with a porous covering 192, composed of several layers of sheet metal. The covering 192 overlaps the upper face of the plate close to the edge, and is held by that plate and the plate 19, between which it is pinched, the plate 191 being secured to the other by screws passing through the latter, as shown. A chamber 21, equal in depth to the thickness of the covering 192, is thus formed between the plates, and with this chamber the hollow bolt 20 is connected. The plate 191 and covering 192 extend a little below the margin of the plate 19, in case the machine is to be used for molding pails or any vessel having a chine, and the covering is so made that it has a tendency to bulge slightly away from the plate, as described and claimed in Letters Patent No. 536,189, dated March 26, 1895.

Between the plate 12 and the collar 17 is the series of sections 22, to each of which is pivoted a link 23, the link being also pivoted to a block 24, fastened against the wall of the casting 3. These links extend inward and downward from the blocks to the sections, as represented in Figs. 1 and 2. Each of these sections is beveled on the face, as indicated in Figs. 3 and 4, its face sloping backward on both sides from a line which runs from the top to the bottom of the section midway between its sides, so that the face lies in two planes that intersect each other on this line, one half of the face being on one side and the other half on the opposite side of the line. On the back of each of these sections are lugs 221, whose rear surfaces are inclined to each other, as shown, at an angle equal to that made by the planes of the face. This series of sections and the series of alternating sections 25 are arranged to slide on radial guides 26 and 27 on the collar 17, and the plate 12, and each of the sections 25 overlaps the faces of the adjacent sections, and is provided with a spring 28, which bears against the backs of the lugs 221 on those sections. The rear surfaces 251 of each of the sections 25 are inclined to one another at the same angle as are the parts which they overlap of the faces of the adjacent sections. When this system of sections, which forms the outer wall of the mold, is

contracted, as shown in Fig. 4, the edges of the sections 25 meet in front of the sections 22, so that the face of each of the sections 25 should conform in shape to an aliquot part of the surface of the body of the vessel which is to be molded. The plate 12 and collar 17 are connected by the series of bolts 120.

In consequence of the special construction and arrangement of the sections, as described, those numbered 25 may be made thick enough not to be unduly weakened by the application thereto of means for draining the mold, even though as many as sixteen sections are employed. The means provided for draining the mold through these sections is specially illustrated in Figs. 6 and 7, and consists of a recess 252, cut in the face of each and extending from the top to the bottom, and having dovetailed edges, the longitudinal grooves 253, cut in the back of the recess and connected at the bottom with grooves 254, extending across the end and converging at the back of the section, where an exit 255 is furnished for the water, and of the facing 256, formed of several layers of perforated brass and having its edges fitted to the dovetailed edges of the recess, so that it is adapted to be pushed into the recess from the bottom, and to be securely held therein with its surface flush with the margin 257 of the section on each side of the facing. Should it be desirable to remove the facing at any time either to repair it or to replace it by another, this may be done, as will be explained hereinafter.

When the parts of the mold are in the respective positions in which they are shown in Fig. 1, the distance from the under surface of the collar 17 to the margin of the plate 19 is equal to the shortest distance from the side of the chamber 18 to the top of each of the sections 22, and the links 23 are so arranged with respect to these sections that when the plate 12, the sections, and the collar are raised until the lower face of the collar is flush with the margin of the plate 19, the sections 22 are forced inward by the links so that the middle of the face of each of these sections at the top is even with the inside of the collar, as shown in Fig. 2. A pipe 172, opening into the mold, is fixed in the collar and extends up through the top or casting 15, in which it is loose, so that it may move up and down with the collar.

In the base are fixed three or more pins 29, which register with a corresponding number of holes 30 in the block 5, and in the flange 102 of the former and the plate 7 are similar holes in which are pins 31, which have heads on their upper ends that rest in cavities in the flange. The pins 29 are of such length that when the block 5 is close to the base the tops of these pins are flush with the top of the block, and the pins 31 are a little longer than the combined thickness of the flange of the former and the plate 7. The upper ends of the fixed pins and the lower ends of the others are rounded.

The pipe 20 in the head, and a pipe 52, lead-



ing from the chamber 51 in the block 5, are connected with a vacuum-pump, and the pipe 13 is connected with a tank containing the pulp.

5 Supposing the parts of the mold to be in relative positions such as are indicated in Fig. 1, the former being elevated so that it closes the opening in the plate 12 and occupies the space outlined by the dotted lines in that figure, then the mold is ready to be charged with pulp. Just before the pulp is admitted to the mold the valve is opened through which communication is made with the pipes 20 and 52 by the vacuum-pump, this pump being ordinarily kept running continuously. The pulp is forced into the mold by pressure, produced by means of an elevated tank or force-pump, and flows through the pipe 13, channel 121, and ports 122 until it fills the space between the former and the sections surrounding it, and the chamber 18 in the collar 17. When the pulp overflows from the pipe 172, which serves as an indicator, the operator knows that the mold is full, and he then cuts off the stream of pulp and closes the valve in the pipe 172. An experienced operator, however, is not likely to depend on this pipe in order to determine when the mold is full, since by keeping his eye on the gage of the vacuum-pump he can determine this with equal certainty, and thus save the trouble of turning the valve in the pipe 172, allowing this to remain closed all of the time. The mold being filled, the valve in the pipe through which water is pumped to actuate the piston is then opened, and the former, the plate 12, the sections, and the collar 17, together with the block 5 and the plate 7, are raised by the piston until the under surface of the collar is flush with the margin of the plate 19 and the sections are even at the top with the edge of the opening in the collar, where they meet the edge of the head, the sections 22 being forced inward by the links 23, as above described, and carrying with them the sections 25, which are held tightly against the faces of the sections 22 by the springs 28. The water is squeezed out of the pulp into the former and the chamber 21 in the head and through the faces of the sections 25. It passes down in the grooves 253 to the plate 12 and flows out behind the sections on the plate through the grooves 254 and exit 255, and thence into the channel 123, and from this into the waste-pipe 124, and from the head and the former it is exhausted by the vacuum-pump. By this operation the pulp is compressed into the form of a pail or similar vessel 32, and there is no surplus quantity of pulp such as remains after the formation of a vessel in each of the other machines above mentioned. The vacuum in the head is then broken, but not the vacuum in the former, and the piston and parts supported by it are allowed to descend, whereupon the vessel is separated from the head and the sections are retracted from the sides of the vessel by the

links 23, the sections 25 being pushed back by the sections 22 acting against the springs 28. The vacuum helps to keep the vessel from being ruptured when the sections are withdrawn from it. The downward movement of the plate 12, the sections, and the collar is arrested by the stop formed by the set-screws in the blocks 14, these parts having then returned to the respective positions which they occupied when the mold was charged with pulp, but the piston and the other parts supported thereon continued to descend, the vacuum in the former being broken while they are in motion until the former is below the casting 3 and the block 5 is close to the base. As these parts approach the base the pins 29 are received in the holes 30 in the block 5, and when their upper ends meet the lower ends of the pins 31 the ring 11 is separated from its seat, and the vessel is thereby loosened from the former so that it may be easily removed therefrom. The former is next drawn forward on the plate 7 by the handle 9, the pins 31 sliding off the pins 29 and over the surface of the block 5. The pail is then lifted off the former. After this the former is restored to its position directly under the opening in the plate 12, and is elevated until the opening is closed by it as above described, the ring 11 dropping into its seat or being forced into it by contact with the plate 12, and the pins 31 descending through the plate 7 into the block 5, as shown in Fig. 2.

In order to remove one or more of the facings 256 of the sections 25 from the machine, the piston is raised until the parts supported thereby are in the positions indicated in Fig. 2, respectively, then wooden or other blocks are inserted between the plate 12 and the set-screws in the blocks 14, to prevent this plate and the sections and collar from descending, and the piston is lowered until the former is withdrawn from the opening in the plate. As the faces of the sections then extend beyond the edge of that opening, as shown in Fig. 5, any of the facings 256 may be drawn downward through the opening, and thus separated from the section.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a machine for molding vessels from pulp, the combination of the head, the sliding collar mounted thereon and adapted to rest with its under surface below the head, whereby a chamber 18 is formed, the contracting and expanding system of sections with their upper ends in contact with the collar, means whereby the sections are forced inward as they are raised, a plate adapted to rest against the lower ends of the sections, the former adapted to project above this plate into the space surrounded by the sections, and mechanism whereby the former and plate together with the sections and collar are lifted, substantially as described.

2. In a machine for molding vessels from



pulp, the combination of the head, the sliding collar mounted thereon and adapted to rest with its under surface below the head, whereby a chamber 18 is formed, the contracting and expanding system of sections with their upper ends in contact with the collar, means whereby the sections are forced inward as they are raised, a plate adapted to rest against the lower ends of the sections, and provided with a central opening, the former adapted to be inserted in the opening in this plate and to project above it into the space surrounded by the sections, and the piston on which the former is mounted and whereby the former and plate together with the sections and collar are lifted, substantially as described.

3. In a machine for molding vessels from pulp, the combination of the head, the sliding collar mounted thereon and adapted to rest with its under surface below the head, whereby a chamber 18 is formed, the contracting and expanding system of sections with their upper ends in contact with the collar, means whereby the sections are forced inward as they are raised, a plate adapted to rest against the lower ends of the sections, and provided with a central opening, bolts connecting the plate with the collar, the former adapted to be inserted in the opening in the plate and to project above it into the space surrounded by the sections, and the piston on which the former is mounted and whereby the former and plate together with the sections and collar are lifted, substantially as described.

4. In a machine for molding vessels from pulp, the combination of the head, the sliding collar mounted thereon and adapted to rest with its under surface below the head, whereby a chamber 18 is formed, the contracting and expanding system of sections with their upper ends in contact with the collar, means whereby the sections are forced inward as they are raised, a plate adapted to rest against the lower ends of the sections, bolts whereby the sections are secured against the collar, the former adapted to project above the plate into the space surrounded by the sections, and mechanism whereby the former and plate together with the sections and collar are lifted, substantially as described.

5. In a machine for molding vessels from pulp, the combination of the head, the sliding collar mounted thereon, and adapted to rest with its under surface below the head, whereby a chamber 18 is formed, the contracting and expanding system of sections with their upper ends in contact with the collar, means whereby the sections are forced inward as they are raised, a plate adapted to rest against the lower ends of the sections, bolts whereby the sections are secured against the collar, guides on which the sections travel, the former adapted to project above the plate into the space surrounded by the sections, and mechanism whereby the former and plate together with the sections and collar are lifted, substantially as described.

6. In a machine for molding vessels from pulp, the combination of the head, the sliding collar mounted thereon and adapted to rest with its under surface below the head, whereby a chamber 18 is formed, the contracting and expanding system of sections with their upper ends in contact with the collar, means whereby the sections are forced inward as they are raised, a plate adapted to rest against the lower ends of the sections, and provided with a central opening, bolts connecting the plate with the collar, guides on which the sections travel, the former adapted to be inserted in the opening in the plate and to project above it into the space surrounded by the sections, and the piston on which the former is mounted and whereby the former and plate together with the sections and collar are lifted, substantially as described.

7. In a machine for molding vessels from pulp, the combination of the head, the sliding collar mounted thereon and adapted to rest with its under surface below the head, whereby a chamber 18 is formed, the contracting and expanding system of sections with their upper ends in contact with the collar, means whereby the sections are forced inward as they are raised, a plate adapted to rest against the lower ends of the sections, bolts whereby the sections are secured against the collar, a stop whereby the collar is prevented from descending entirely below the head, the former adapted to project above the plate into the space surrounded by the sections, and mechanism whereby the former and plate together with the sections and collar are lifted, substantially as described.

8. In a machine for molding vessels from pulp, the combination of the head, the sliding collar mounted thereon and adapted to rest with its under surface below the head, whereby a chamber 18 is formed, the contracting and expanding system of sections with their upper ends in contact with the collar, means whereby the sections are forced inward as they are raised, a plate adapted to rest against the lower ends of the sections, and provided with a central opening, bolts connecting the plate with the collar, a stop underneath the plate, the former adapted to be inserted in the opening in the plate and to project above it into the space surrounded by the sections, and the piston on which the former is mounted and whereby the former and plate together with the sections and collar are lifted, substantially as described.

9. In a machine for molding vessels from pulp, the combination with top and bottom plates of the series of movable sections 22 each having its face in two planes, which intersect each other in a line running from the top to the bottom of the section midway between its sides, and which slope backward from that line, the sections 25 adapted to close the spaces between the sections 22, and to be actuated in common with those sections, and mechanism whereby the system of sections is con-



tracted and expanded, substantially as described.

10. In a machine for molding vessels from pulp, the combination with top and bottom plates of the series of sections 22 each having its face in two planes which intersect each other in a line running from the top to the bottom of the section midway between its sides, and which slope backward from that line, means whereby those sections are forced inward and retracted, and the sections 25 interposed between, and overlapping, and conforming to the faces of, the sections 22, and connected with those sections at the back, substantially as described.

11. In a machine for molding vessels from pulp, the combination with top and bottom plates of the series of sections 22 each having its face in two planes which intersect each other in a line running from the top to the bottom of the section midway between its sides, and which slope backward from that line, links whereby those sections are forced inward, the sections 25 interposed between, and overlapping, and conforming to the faces of, the sections 22, and means whereby all the sections are retracted together, substantially as described.

12. In a machine for molding vessels from pulp, the combination with top and bottom plates of the series of sections 22 each having its face in two planes which intersect each other in a line running from the top to the bottom of the section midway between its sides, and which slope backward from that line, and having lugs 221 at the back, means whereby those sections are forced inward and retracted, and the sections 25 interposed between, and overlapping, and conforming to the faces of, the sections 22, and provided with springs 28 which bear against the lugs 221 on the other sections, substantially as described.

13. In a machine for molding vessels from pulp, the combination with top and bottom

plates of the series of sections 22 each having its face in two planes which intersect each other in a line running from the top to the bottom of the section midway between its sides, and which slope backward from that line, and having lugs 221 at the back, links 23 pivoted to those sections, the sections 25 interposed between, and overlapping, and conforming to the faces of, the sections 22, and provided with springs 28 which bear against the lugs 221 on the other sections, and mechanism whereby the links 23 are actuated, substantially as described.

14. In a machine for molding vessels from pulp, the combination of a contracting and expanding system of mold-sections, provided with detachable porous facings, and a plate in contact with the ends of the sections and provided with an opening beyond whose edges the faces of the sections project when the system is contracted, substantially as described.

15. In a machine for molding vessels from pulp, the combination with the former arranged to swing outward, and provided with a ring 11, of movable pins 31 under the ring, and fixed pins 29 on which the movable pins may rest with their lower ends even with the surface over which the former moves, and with their upper ends above the bed of such ring, substantially as described.

16. In a machine for molding vessels from pulp, the combination of the former arranged to swing outward, the ring 11, the pins 31 inserted in the bed on which the ring lies, the block 5 over whose surface the former moves and in which are the holes 30, and the fixed pins 29 adapted to extend through the holes 30 and remain flush with the upper surface of the block 5, when the former is in its lowest position, substantially as described.

MARK L. DEERING.

In presence of—

CHAS. COLEMAN MILLER,  
S. G. METCALF.