No. 780,296. PATENTED JAN. 17, 1905.

R. S. KIRKPATRICK.

# DROPPING MECHANISM FOR CORN PLANTERS.

APPLICATION FILED MAY 22, 1903.

3 SHEETS—SHEET 1.

Fig. 1.

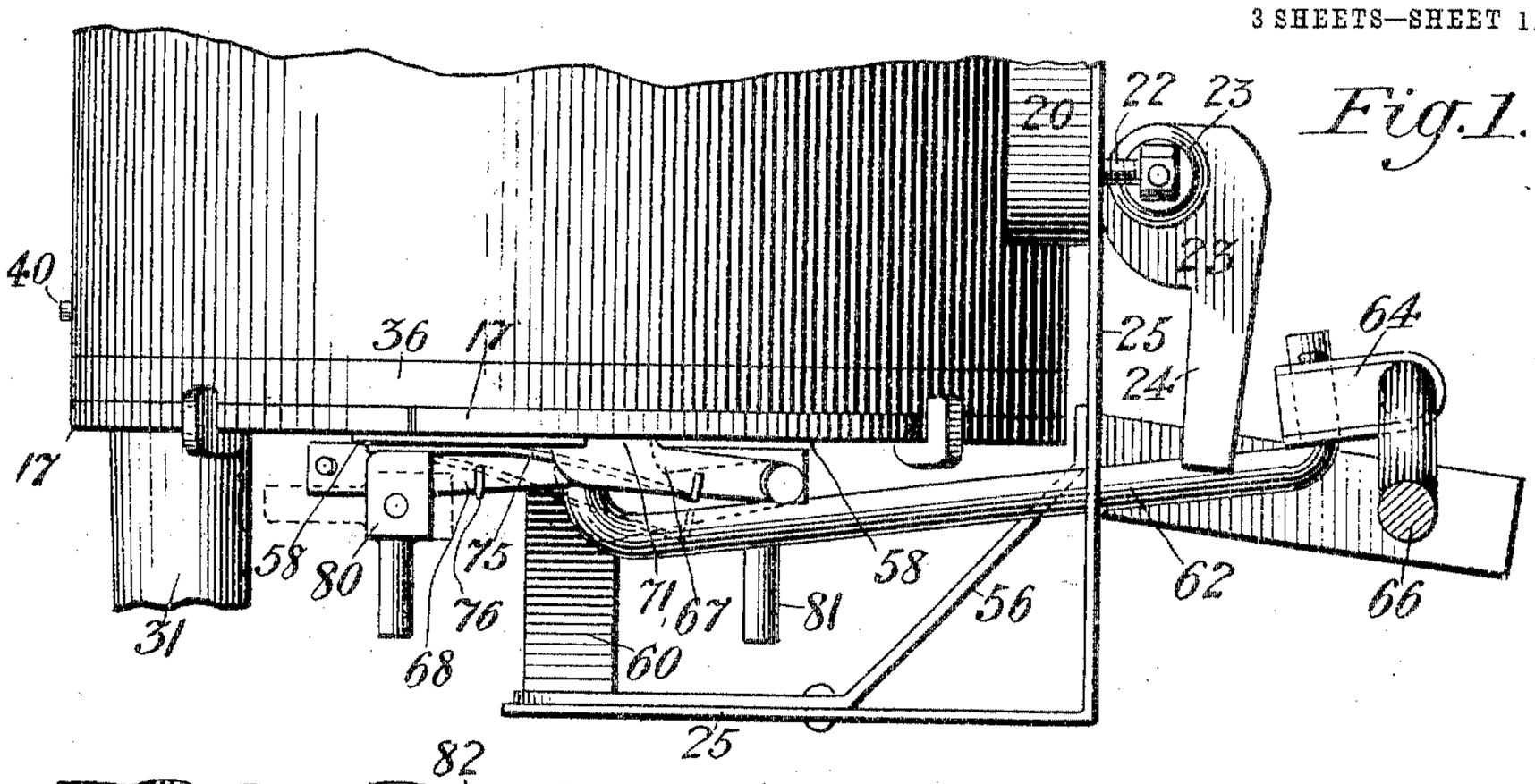



Fig. 2.

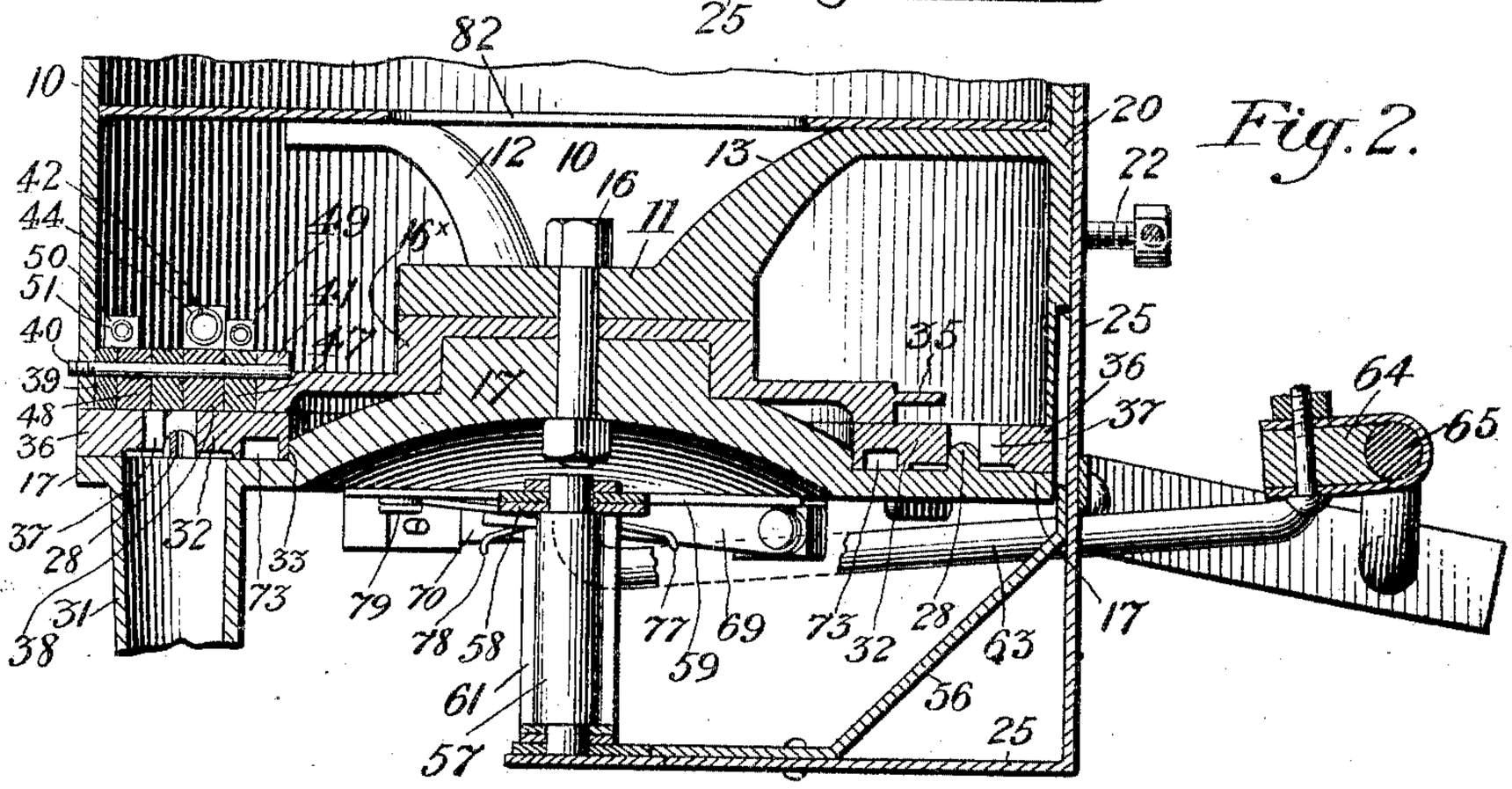



Fig. 8.

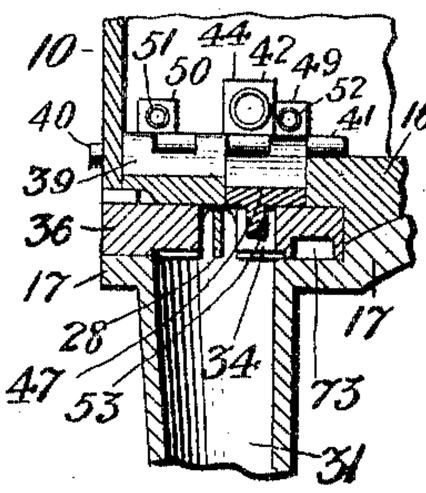
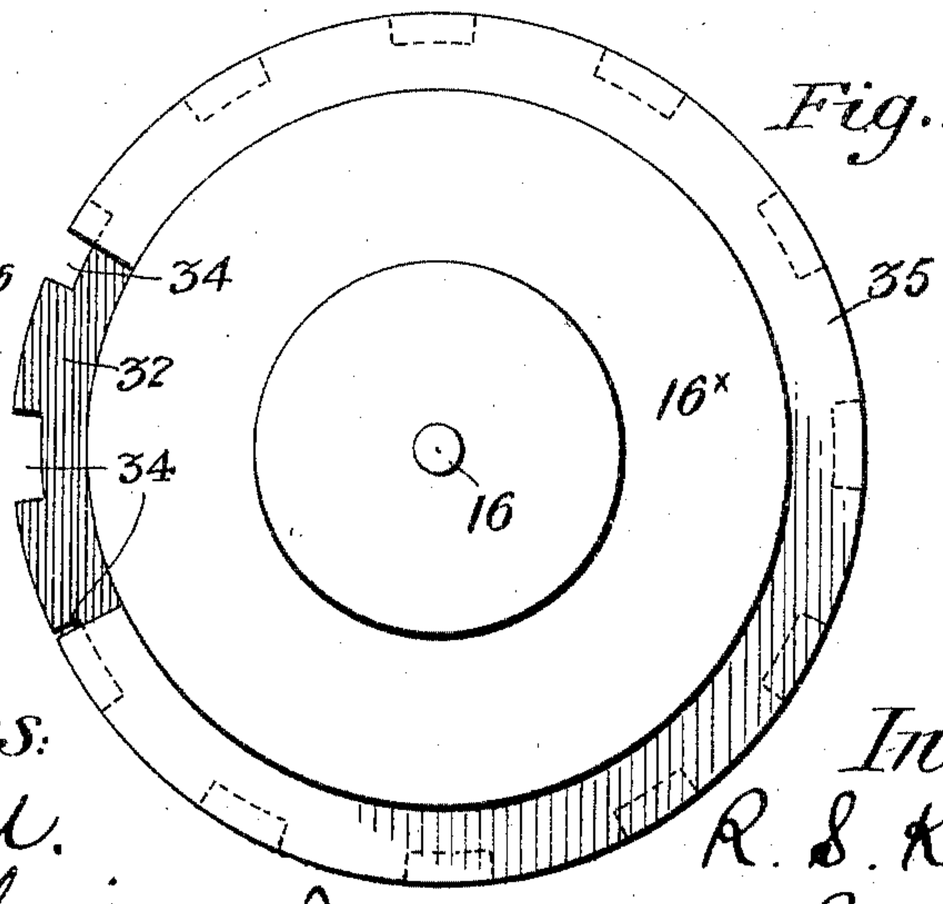



Fig. 7.

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3 SHEETS—SHEET 2.

Fig. 3.

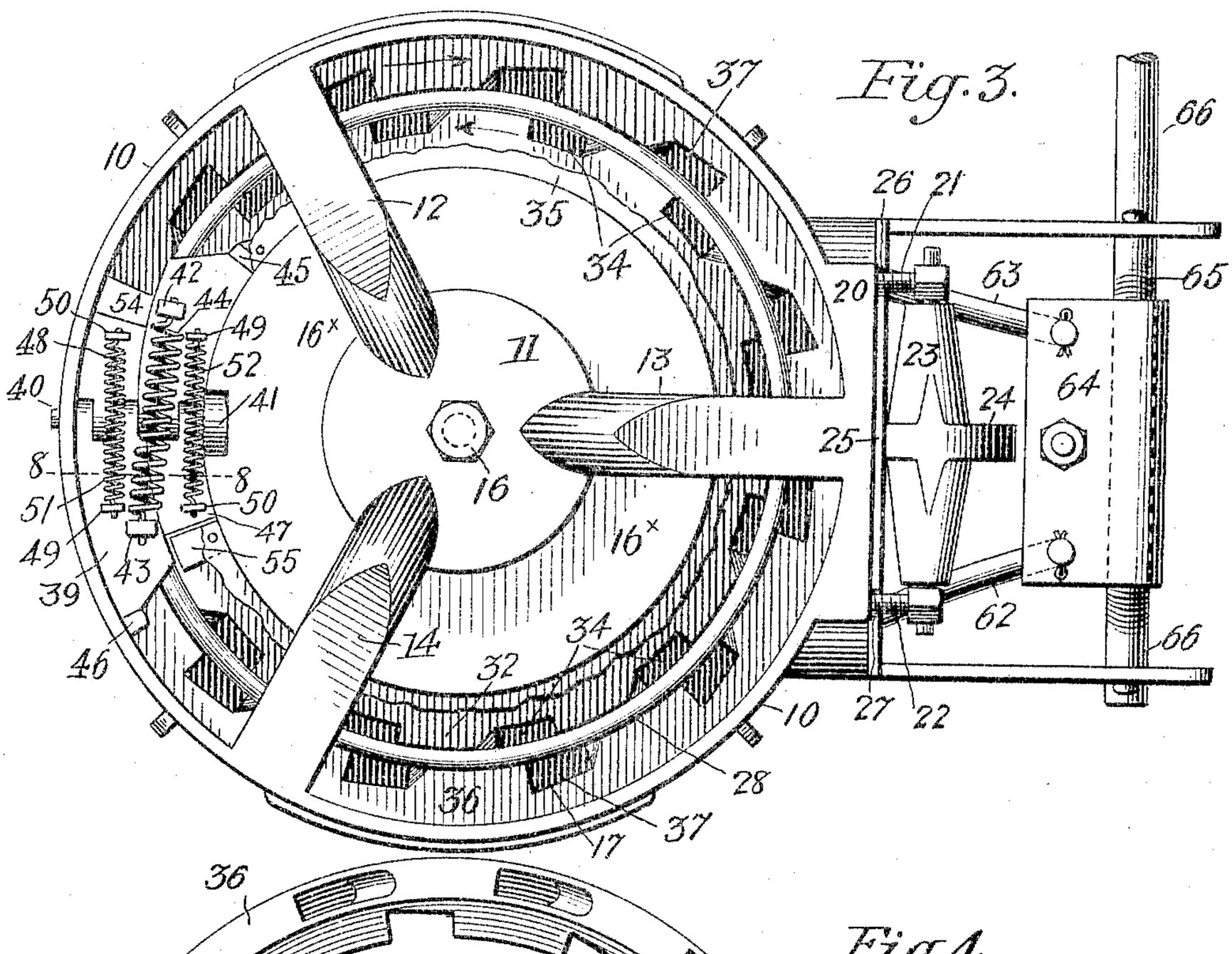
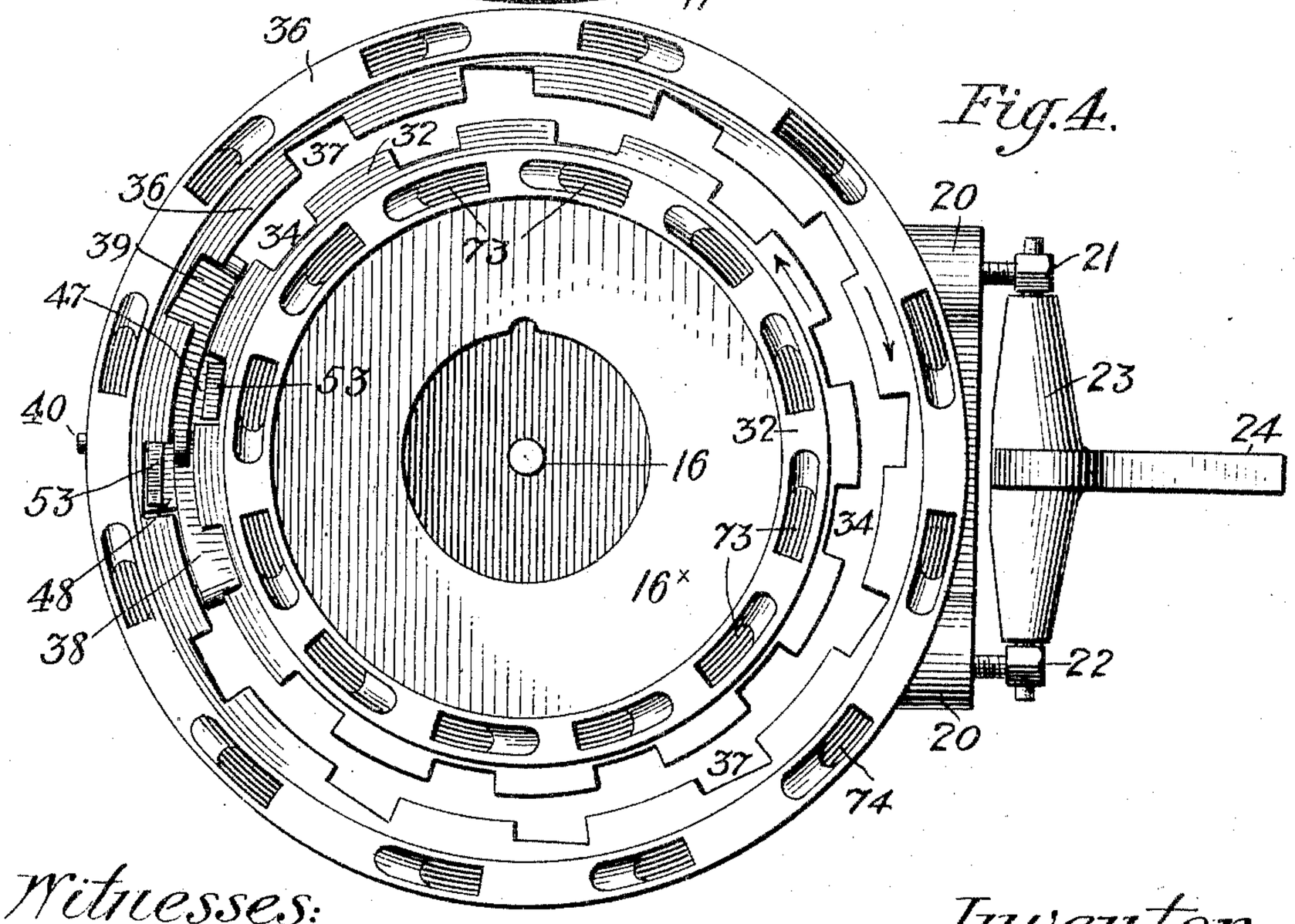



Fig. 4.

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3 SHEETS—SHEET 3.

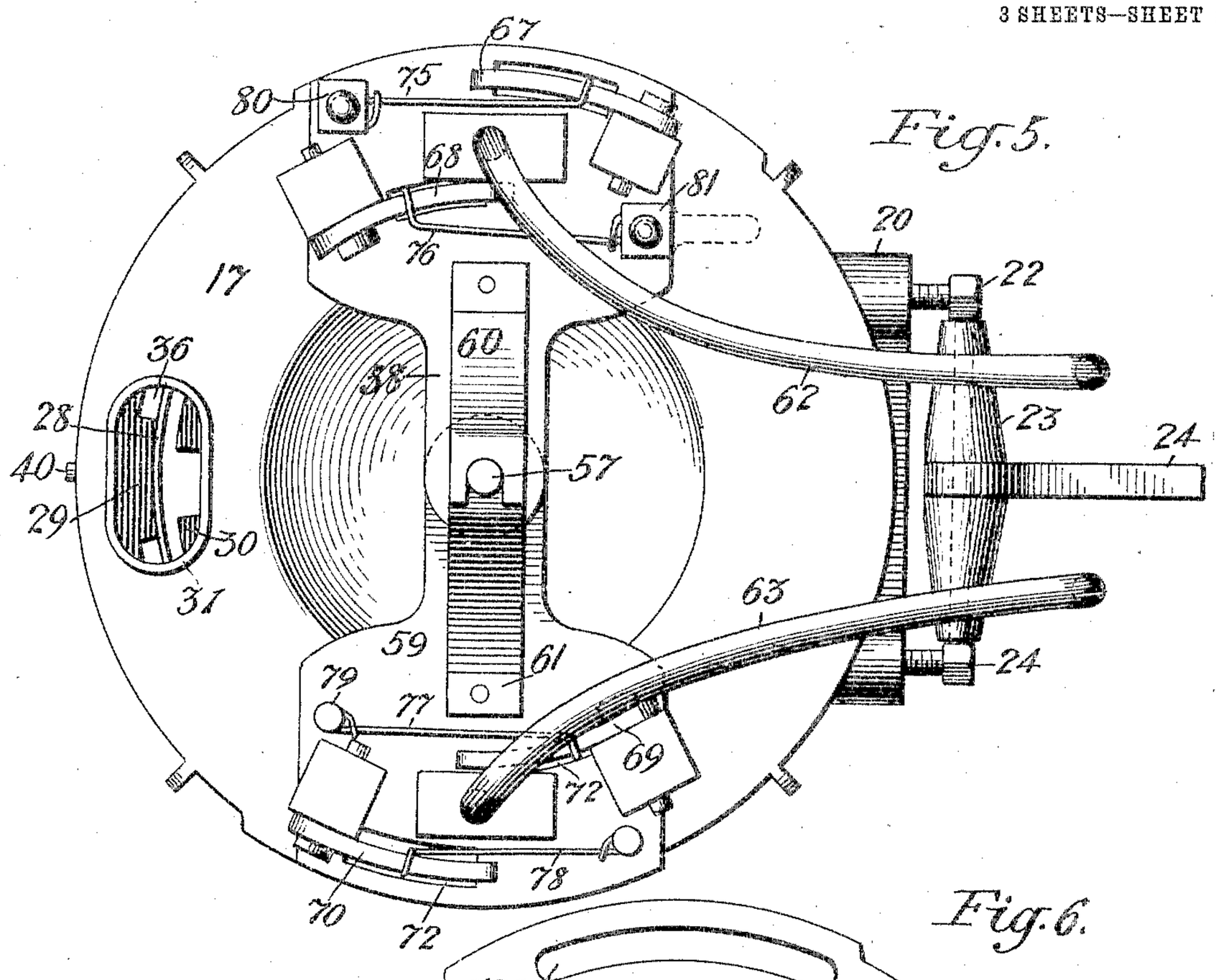
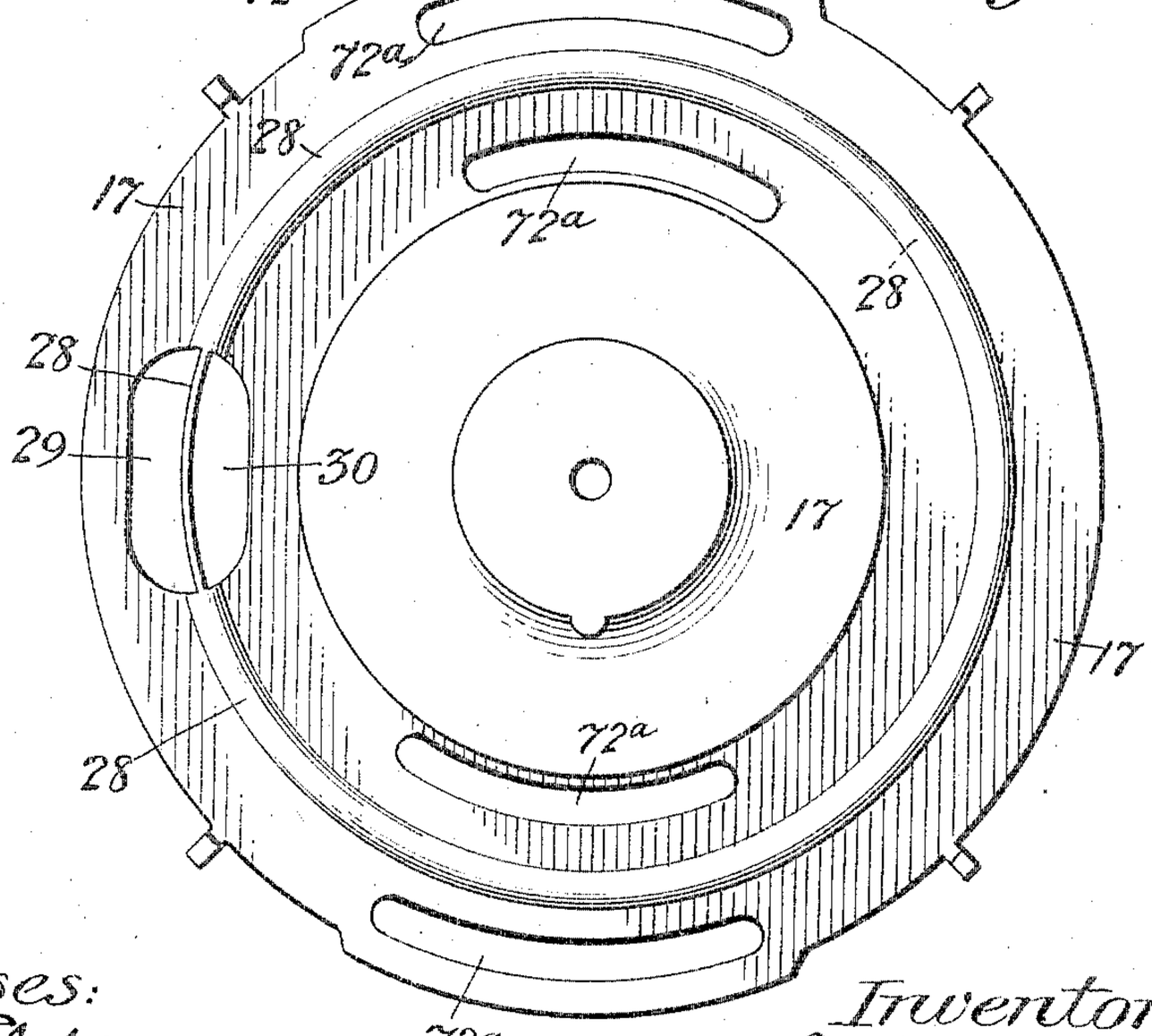



Fig. 5.

Fig. 6.

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No. 780,296. Patented January 17, 1905.

# UNITED STATES PATENT OFFICE.

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## DROPPING MECHANISM FOR CORN-PLANTERS.

SPECIFICATION forming part of Letters Patent No. 780,296, dated January 17, 1905.

Application filed May 22, 1903. Serial No. 158,380.

*To all whom it may concern:*

Be it known that I, ROBERT S. KIRKPATRICK, a citizen of the United States of America, and a resident of Des Moines, Polk county, Iowa, have invented a new and useful Dropping Mechanism for Corn-Planters, of which the following is a specification.

The object of this invention is to provide improved means for selecting, counting out, separating, and delivering to the dropping-valve or heel-valve of a corn-planter single grains or kernels of corn successively and progressively.

The invention relates to the dropping mechanism of corn-planters, and particularly to that type where the bottoms of the hoppers or other receptacles for holding the corn are provided with revolving plates having cups or cells into which the grains settle and are received and from which they are discharged as each cell passes over an opening leading to the spouts or tubes. The delivery of the grains from these spouts is controlled by valves which are operated so as to drop any desired number of grains when planting in hills, or when it is desired to drill the corn in rows may be operated so as to drop them one at a time as they fall from the cells in the hopper-bottom. In this type of droppers it is essential that the mass of corn in the hoppers be kept agitated in order to facilitate the entry of the grains into the cells, and usually some means other than the seed-plates themselves or some particular construction of the plates has been employed for this purpose. In the present invention, however, plain flat plates are contemplated and the necessary agitation of the corn is effected by the employment of two plates and giving them a differential movement with respect to each other. These plates revolve in the same horizontal plane and are notched in adjacent edges to provide the seed cups or cells. A rib or partition rises from the bottom of the hopper, in contact with which both plates revolve, one on the inside and one on the outside, and the rib not only forms a division between the plates, but closes the open notches on one side and completes the formation of the cells. Preferably the plates are revolved with a step-by-step motion in opposite directions; but whether this manner of operating them be employed or not the differential movement of one with respect to the other keeps the overlying mass of corn moving and not only prevents the undue accumulation of grains at the cut-offs, but facilitates the entrance of the grains into the cells, each plate serving to feed the other and the rib between the plates acting also on the grains and serving to direct them to the cells and prevent lodgment between the plates, thus dispensing with the overlying narrowing feed-groove and the agitators for the grains, which are essential features of all planters of the "edge-drop" type. The invention also contemplates an arrangement for varying the movement of either plate so as to drop a greater or less number of grains at each actuation of the valve in the spout instead of requiring the substitution of other plates having different numbers of cells, as has heretofore been necessary, and the hopper itself is connected to the machine and its bottom is secured in such manner as to permit the hopper to be tilted up and the bottom and the entire dropping mechanism to be removed from below.

The preferred form of the invention is illustrated in the accompanying drawings, forming part of this specification, wherein—

Figure 1 is a side elevation illustrating the application of my improved dropping mechanism to a seedbox or hopper and the step-by-step arrangement for operating the seed-plates. Fig. 2 is a vertical section diametrically of Fig. 1. Fig. 3 is a plan of a hopper or seedbox to which my devices are attached, the annular flange overlapping one of the seed-plates being broken away to reveal the construction and location of the plate. Fig. 4 is a bottom plan of the seedbox, the bottom plate of the box being removed. Fig. 5 is a bottom plan of the seedbox, together with the bottom plate and actuating mechanism. Fig. 6 is a top view of the bottom plate of the seedbox detached from the other devices. Fig. 7 is a plan of a portion of the interior de-

vices, including one of the seed-plates, the hub around which said plate revolves, and the protecting-ring whereby packing of the corn on the seed-plates is prevented; and Fig. 8 is a vertical section on the indicated line 8 8 of Fig. 3.

In the construction of the machine, as shown, the numeral 10 designates the lower portion of a seedbox or hopper of cylindrical form and preferably made of metal. The upper portion of the box, which is shown broken away in the drawings, may be made in any desired manner, but preferably also of metal, and is mounted in any suitable way on or is a continuation of the lower portion 10 and is provided with a cover in a common manner, if desired. A hub 11 is located in the central portion of the seedbox 10 near the bottom and is connected to the walls of the box by radial arms 12, 13, and 14. The hub is centrally apertured for the reception of a bolt 16, and a dome-plate $16^{\times}$ is provided and mounted beneath the hub 11 on the bolt. The dome-plate $16^{\times}$ is cut away or recessed on the under side of its central portion, and the bottom plate 17 of the box is provided with a central hub or boss projected upwardly, so as to fit in the recessed portion of the dome-plate and be confined therewith to the hub 11 by the bolt 16 and a nut thereon. The dome-plate $16^{\times}$ is of materially greater diameter than the hub 11, but of materially less diameter than the bottom plate 17, said bottom plate being of the diameter of the box 10 and serves as a bottom therefor, a space being provided between the outer edge of the dome-plate and the inner wall of the box for the reception of seed-plates, as hereinafter described. The use of the bolt 16 connecting the hub 11, dome-plate $16^{\times}$, and bottom plate 17 insures a rigid and firm connection of the parts to each other and at the same time provides for the removal of the bottom plate and dome-plate conveniently from the seedbox when the latter is inverted.

The seedbox is provided on the outside with a boss 20, projecting from one side, as shown in Figs. 1 and 3, and screws 21 22 are seated in said boss at opposite ends and have their heads in alinement laterally thereof. A cam-latch 23 is provided and formed with pivots on its extremities fitting in apertures in the heads of the screws 21 22, and a handle 24 is formed on the central portion of said latch. A bracket 25 is mounted on a suitable and convenient portion of the frame of a corn-planter. This bracket is formed with notches 26 27 in its upper edge to receive and retain the screws 21 22 by vertical movement relative thereto. The entire seedbox, including the screws 21 22, may be lifted away from the bracket 25 and inverted for the purpose of removing, substituting, or replacing the seed-plates from the bottom of the box. When in use, the box is locked securely to the bracket 25 by engagement of the cam-latch 23 with the outer face of the bracket, as illustrated particularly in Fig. 1.

A rib or annular partition 28 is formed on and projects upward from the bottom plate 17, concentric with the periphery of the hub 11 and approximately midway of the space between the edge of the dome-plate $16^{\times}$ and the inner wall of the seedbox. This rib or partition is cut away at one side of the box coincident with apertures 29 30, formed through the bottom plate for the passage of corn to a spout 31, whereby it is conveyed to the standard or heel-valve in the runner of the planter.

I have not illustrated the heel-plate nor runner of the corn-planter for the reason that my device is adapted for use in connection with various forms of these devices, and I do not limit myself to the use of either of such forms. Furthermore, these devices form no part of my present invention, and it is assumed that general knowlege of the construction of such parts is sufficient to make clear the application of my invention thereto.

A seed-plate 32 of annular form is mounted loosely on the bottom plate 17, concentric with the hub 11 and immediately beneath the outer edge of the dome-plate. The seed-plate 32 is confined between the inner surface of the partition or rib 28 and the annular shoulder 33 on the bottom plate and is revolved in such seat by a step-by-step motion, as will be hereinafter described. The plate 32 is provided with seed cells or cups 34 around its peripheral or rim portion at regular intervals or spaces, and an annular flange or projection 35 on the dome-plate $16^{\times}$ overlaps the seed-plate 32 and the cells therein and tends to sustain the mass of corn in the box 10 normally above and out of contact with the plate. It is to be understood that the flange 35 does not completely cut off the flow of corn from the box to the seed-plate, but simply retards and holds back its delivery and prevents the packing and clogging of the corn by reason of an accumulation of an excess quantity on the plate. It will be observed that the seed cups or cells 34 of the plate 32 travel in an orbit intersected by the aperture 30 in the bottom plate 17, and in one complete revolution of the plate each of the cells 34 is successively brought over and into registration with said aperture for the delivery of a single grain or kernel of corn to the spout 31. A second seed-plate 36 is mounted on the bottom plate 17 outside of the rib or partition 28 and concentric with the seed-plate 32 and the hub 11. This plate 36 is in the same horizontal plane as the plate 32 and is of an exterior diameter coinciding with the diameter of the seedbox 10 and the bottom plate 17. The plate 36 is formed with seed cells or cups 37 in its inner edge adjacent the rib or partition 28. It will be observed that the cells 37 are spaced apart a greater distance than the cells 34, but equal them in number, and that

the cells 37 are arranged to travel in an orbit intersected by an aperture 29 through the bottom plate 17. Hence in one complete revolution of the seed-plate 36 each of the cells 37 is brought successively into registration with the aperture 29 for the delivery of a single kernel or grain of corn to the spout 31. (See Fig. 5.) As will be understood from Fig. 3, the seed cups or cells in the plates 32 and 36 are formed by cutting notches in the outer edge of the inner plate and the inner edge of the outer plate, the adjacent sides of the notches being open, as shown. The partition or rib 28 separates the plates and forms an outer bearing for the inner plate and an inner bearing for the outer plate and closes the notches in each plate, so as to complete the cells. It furthermore assists in the feeding of the corn to the plates by insuring the delivery of the grains edgewise into the cells of one or the other plate. To this end the rib or partition is formed with a rounding upper edge, so that grains lodging between the plates cannot rest on the rib, but will turn edgewise and slide off into the cells of either plate, and the rib is preferably of slightly less height than the thickness of the seed-plates adjacent thereto.

It is desirable to cover the apertures 29 30 leading to the spout 31 and the seed-cups which may momentarily be positioned above said apertures in order that the free and unobstructed delivery or discharge of the seed-corn from the box to the spout 31 may be avoided. To this end I have provided cut-offs 38 39 over the seed-plates 32 36, respectively. These cut-offs are pivoted at their inner end portions on a pin whose outer end is secured to the wall of the seedbox and whose inner end is fixed in an ear 41, formed on the dome-plate $16^{\times}$. Ears 42 43 are mounted on and rise from the cut-offs 38 39, respectively, and an expansive coil-spring 44 is mounted so as to react between said ears and tends to hold the cut-offs down on the upper surface of the seed-plates. It is the function of these cut-offs to sheer off or remove the grains of corn from the upper surface of the seed-plates just before the cells deliver their grains into the spout and at the same time obstruct the passage of more than one grain at a time in each cell or notch of the plates. Since the seed-plates as here shown are arranged to move in opposite directions, as hereinafter described, in connection with the step-by-step actuating mechanism, it is desirable to put the cut-offs on opposite sides of the pivotal pin 40 and hold them down on the plates by a single spring 44, acting mutually thereon. It sometimes occurs that a grain or kernel of extraordinary width is received in one or another of the cells or notches, and hence it is desirable that the cut-off should yield upwardly for the passage of such grain and the delivery thereof to the spout 31. At the same time it is desirable to avoid retaining the cut-off in such elevated position by the introduction of a grain or kernel of corn between the upper face of a seed-plate and the lower face of the cut-off, and to this end I provide lugs 45 46 on the dome-plate $16^{\times}$ and box 10, respectively, and projecting across the upper faces of the respective seed-plates immediately in advance of the outermost extremities of the cut-offs. These lugs 45 46 prevent the approach of seed-corn to the extremities of the cut-offs and leave to them only the work of clearing extra grains from the cells and those portions of the plates between the cells.

I have said that the marginal flange 35 is annular and have used such expression to indicate its circularity or ring formation; but attention is called to the fact that the flange is cut away throughout the space occupied by the cut-offs and the knockers or ejectors adjacent thereto, about to be described, (see Fig. 7,) for the reason that the cut-offs and knockers serve the purpose of the flange at such points and prevent clogging of the corn on the seed-plates.

Knockers 47 48 are provided and pivoted at their inner ends on the pin 40 and extend along the upper surfaces of the seed-plates in directions opposite to the extension of the cut-offs 38 39. Ears 49 50 are mounted on and rise from the cut-offs and knockers, respectively, and expansive coil-springs 51 52 are interposed between said ears and tend by expansion to hold the knockers to their seats in engagement with the upper surfaces of the seed-plates. Each of the knockers 47 48 is provided with a lug or tooth 53, located in the orbit of travel of one or the other of the sets of cells 34 37. Each tooth or lug 53 is beveled away (see Fig. 4) on that side from which a cell approaches in order that it may be engaged by and ride over these portions of the seed-plates between the cells. In the advance of the seed-plates beneath the knockers the springs 51 52 yield to compression to permit the elevation of the knockers, and thereby store or acquire resilience sufficient to depress the knockers within the seed-cells. In the depression of the knockers to the seed-plates and the entrance of the lugs or teeth to the seed-cells the grains or kernels of corn are expelled from said cells through the apertures 29 30 to the spout 31. It is desirable that the knockers shall rise and fall with regularity and not be obstructed by the accidental introduction of a grain or kernel beneath their outer ends, and to this end I provide lugs 54 55 on the seedbox 10 and dome-plate $16^{\times}$, respectively, which lugs extend across the upper faces of the seed-plates and protect the knockers from the mass of grain, and the extremities of the flange 35 may be formed integrally with these lugs 45 55, if desired.

The bracket 25 extends beneath the bottom plate 17 and is provided with a brace 56. A stud or post 57 is mounted in and rises from

the extremity of the bracket 25 and brace 56 in alinement with the bolt 16. Actuating-arms 58 59 are pivoted at their inner ends on the upper end portion of the post 57 and extend in opposite directions therefrom to the periphery of the seedbox and bottom plate 17. Braces 60 61 are fixed to the outer portions of the actuating-arms 58 59 and extend inward and downward therefrom to the lower portion of the post 57 immediately above the extremity of the brace 56. Pitmen 62 63 are pivotally connected at their inner ends to the outer end portions of the actuating-arms 58 59, and the outer end portions of said pitmen are turned upward and extend through a pitman-head 64. A crank 65 of a shaft 66 extends through the pitman-head 64 and in the rotation of said shaft carries said pitman-head through an orbit and establishes and maintains a reciprocal movement of the actuating-arms and pitmen. The shaft 66 may be termed the "operating-shaft" of the corn-planter, and it may be rotated by gearing directly from the axle or traction mechanism of the corn-planter in a common and well-known manner or by any other desired motive power. Pawls 67, 68, 69, and 70 are pivoted on the outer portions of the actuating-arms 58 59, and studs or teeth 71, one on each of said pawls, extend through slots 72 in the actuating-arms and engage in one or another of a series of ratchet openings or notches 73 74 in the under sides of the seed-plates 32 36. There are as many ratchets 73 74 in the lower faces of the seed-plates 32 36 as there are cells or notches in the seed-plates, and the arrangement of the pawls is such that the teeth of the outermost pawls 67 70 engage alternately in the ratchets 74 of the seed-plate 36, while the teeth of the innermost pawls 68 69 engage alternately in ratchets 73 of the seed-plate 32. The pawls are held normally with their teeth in engagement with the seed-plate ratchet notches or openings by springs 75, 76, 77, and 78. The springs 77 78 are mounted on the actuating-arm 59 by means of pins 79 and constantly engage and press the pawls 69 70 toward said actuating-arm, while the springs 75 76 are held beneath latches 80 81, pivoted on the actuating-arm 58, and normally press the pawls 67 68 toward said actuating-arm. The latches 80 81 hold the springs 75 76 firmly against the pawls 67 68 when in their normal positions; but either or both of said latches may be turned toward the actuating-arm 58 and release the pressure on the springs, permitting said springs to fall and allow the descent of the pawls supported thereby, as illustrated by dotted lines in Fig. 1. When all four of the pawls are in normal position, with the teeth thereof engaging the seed-plates, upon an actuation of the arms 58 59 by the shaft and pitman each of the seed-plates will be advanced one notch or one unit of a revolution with each movement of the arms—that is to say, when the arm 59 moves forward away from the shaft 66 the pawl 69 moves the seed-plate 32 forward one notch, and when said arm returns under the pulling impulse of the pitman 63 the pawl 70 engages and moves the seed-plate 36 one notch. At the same time the arm 58, moving away from the shaft 66, causes the pawl 67 to engage and move the seed-plate 36 one notch, and upon the return of said arm toward the shaft the pawl 68 engages the seed-plate 32 and moves the same one notch. Thus in the forward movement of the pitmen a pawl engages and moves each of the seed-plates, and in the rearward movement of the pitmen other pawls engage and move each of the seed-plates, making two movements of each plate for each revolution of the shaft. In the four movements of the two plates four grains of corn are received by the cells or seed-cups and delivered to the spout 31. If it is desired to drop three grains only of corn at a time, one of the latches 80 81 is turned up to release the pawl connected with the spring thereon from the seed-plate, and if two grains only are to be dropped at a time the other latch is turned in like manner to release its pawl from the seed-plate. In the latter case one complete revolution of the dropping-shaft 66 effects the forward movement of each plate one notch only and drops two grains into the spout 31. Other means may be employed and other devices adopted for releasing the engagement of the pawls from the seed-plates without affecting my invention, as I do not limit myself to this specific means for releasing these pawls. As a further means of preventing packing and clogging of corn on the seed-plates I mount a removable and replaceable plate 82 transversely of the box 10 and rest the same on the arms 12, 13, and 14. The plate 82 is imperforate, save for a single central aperture through which the corn may feed from the upper portion of the box upon the hub 11 and dome-plate $16^{\times}$ and thence over the dome-plate and flange 35 to the seed-plates.

I do not desire to limit myself to the use of narrow elongated seed-cells for the edgewise reception of the grains, but may employ circular or other shapes of cells for the reception of the kernels flatwise. Neither do I desire to limit myself to the step-by-step movement of the plates nor to their movement in opposite directions. So far as I am aware, it is broadly new in corn-planters to employ more than one seed-plate, and it is essential, when using only one, to employ some means for agitating the mass of corn resting on the plate so as to insure that the grains will find their way into the cells. When using two or more plates, however, as in the present invention, it is unnecessary to have any agitating means, as each plate serves as a feeder for the other, and in the preferred arrangement herein illustrated, where the plates are

annular and one is arranged within the other and where there is a differential movement between the plates, the overlying corn is kept constantly moving, whereby the grains are enabled and assisted to find their way edgewise into the cells of both plates. Neither do I desire to be limited to the employment of the partition or rib between the plates, as the agitation of the corn would be effected by the movement of the plates even were the rib omitted. I regard the rib, however, as an important adjunct, and its function of turning over sidewise any grains that lodge upon it causes them to assume the position most favorable for entry into the cells of the seed-plates. It is to be noted in respect of the reverse movement of the plates that the overlying mass of corn is not only kept agitated, but that the undue accumulation of grains at the point of cut-off is prevented, the arrangement of the cut-offs being such that one plate is always moving away from one of them. This carrying of the corn away from the point of cut-off I believe to be entirely new, no matter what means are employed to effect it. It is also to be noted that though the rib between the plates is lower than the plates and rounded on its upper edge its function of tilting the grains over laterally would be effected to an advantageous degree if it were not so formed, and I desire to cover it in connection with the plates broadly and without regard to its construction.

I claim as my invention—

1. A dropping mechanism for corn-planters, comprising concentrically-arranged seed-plates formed with seed-cells in their adjacent edges, and means for rotating said plates.

2. A dropping mechanism for corn-planters, comprising concentrically-arranged seed-plates formed with seed-cells in their adjacent edges, and means for rotating any of said plates.

3. A dropping mechanism for corn-planters, comprising concentrically-arranged seed-plates formed with seed-cells in their adjacent edges, and means for rotating said plates in opposite directions.

4. A dropping mechanism for corn-planters, comprising concentrically-arranged seed-plates formed with seed-cells in their adjacent edges, and means for rotating said plates in opposite directions step by step.

5. A dropping mechanism for corn-planters, comprising concentrically-arranged seed-plates formed with seed-cells in their adjacent edges, mechanism for rotating said plates with a step-by-step motion, and means for varying the speed of rotation of the plates.

6. A dropping mechanism for corn-planters, comprising concentrically-arranged seed-plates formed with seed-cells in their adjacent edges, mechanism for rotating said plates with a step-by-step motion, and means for varying the speed of rotation of either plate relatively to the other.

7. The combination of a seedbox, seed-plates arranged therein concentric with each other, each plate formed with a row of cells adjacent to the cells of the other, and means for rotating the plates.

8. The combination of a seedbox, seed-plates arranged therein concentric with each other, each plate formed with a row of cells adjacent to the cells of the other, step-by-step mechanism for rotating the plates, and means for varying the rate of rotation of the plates.

9. The combination of a seedbox, concentric seed-plates therein, formed with seed-cells in their adjacent edges, and a protecting-flange overlapping one of the seed-plates and serving to prevent clogging of the corn.

10. The combination of a seedbox, concentrically-arranged seed-plates having cells therein, cut-offs on said plates, and means for rotating the plates.

11. The combination of a seedbox, concentric seed-plates therein, each formed with seed-cells, cut-offs on said plates, knockers on said plates, and means for rotating the plates.

12. The combination of a seedbox, concentrically-arranged seed-plates therein, each formed with seed-cells, cut-offs engaging the upper surfaces of said plates, knockers also engaging the upper surfaces of the plates, lugs on the knockers arranged to enter the cells of the plates, and means for rotating the plates.

13. The combination of a seedbox, seed-plates removable from the bottom of the box and arranged concentric with each other, each seed-plate formed with seed-cells, and means for rotating the plates.

14. The combination of a seedbox, seed-plates concentrically arranged therein and formed with seed-cells in their adjacent edges, a partition or rib between said seed-plates, and means for rotating the plates.

15. The combination of a seedbox, seed-plates concentrically arranged therein and formed with seed-cells on adjacent edges, a partition or rib between said plates and between the orbits of travel of the seed-cells, and means for rotating the plates.

16. The combination of a seedbox, concentrically-arranged seed-plates therein formed with seed-cells on adjacent edges, a partition or rib between said plates, a protecting-flange overlapping one of said plates, and means for rotating the plates.

17. The combination of a seedbox, concentrically-arranged seed-plates therein formed with seed-cells in their adjacent edges, a partition or rib between said plates, cut-offs on said plates, knockers on the plates, studs on the knockers arranged to enter the cells of the plates, and means for rotating said plates.

18. The combination of a seedbox, seed-plates concentrically arranged therein and provided with cells, and a protecting-plate above the seed-plates.

19. The combination of a seedbox, seed-plates therein, a protecting-flange overlapping one of the plates, and a protecting-plate above the protecting-flange.

20. The combination of a seedbox, seed-plates therein, oscillating actuating-arms, pawls on said arms engaging the seed-plates, and a partition or rib between said seed-plates.

21. The combination of a seedbox, concentrically-arranged seed-plates therein, oscillating arms, pawls on said arms engaging the seed-plates, and cut-offs on the seed-plates.

22. The combination of a seedbox, concentrically-arranged seed-plates therein, each formed with seed-cells, cut-offs on the plates, knockers on said plates, studs on the knockers arranged to enter the cells of the plates, oscillating arms, and pawls on said arms engaging the seed-plates.

23. The combination of a seedbox, concentrically-arranged seed-plates therein, each formed with seed-cells, cut-offs on the plates, knockers on the plates, studs on the knockers arranged to enter the cells of the plates, oscillating actuating-arms, pawls on said arms engaging the seed-plates, and springs acting on the pawls.

24. The combination of a seedbox, concentrically-arranged seed-plates therein, each formed with seed-cells, cut-offs on the plates, knockers on the plates, studs on the knockers arranged to enter the cells of the plates, oscillating actuating-arms, pawls on said arms engaging the seed-plates, springs acting on said pawls, and means for releasing either of the pawls.

25. The combination of a seedbox, seed-plates therein, oscillating actuating-arms, pawls on said arms engaging the seed-plates, springs on the arms engaging the pawls, and latches on the arms for engaging said springs with and releasing them from said pawls.

26. In a dropping mechanism for corn-planters, the combination of two concentric, rotating, seed-plates, each having cells adapted to receive and hold single grains, and means for rotating said plates so that the overlying corn will be agitated and each plate will feed the grains into the cells of the other.

27. In a dropping mechanism for corn-planters, the combination of two concentric, rotating, seed-plates, having their adjacent edges notched to form cells to receive and hold the grains edgewise, and an annular rib or partition between the plates closing the adjacent sides of the cells of the plates, and serving to deflect the grains into the cells of each plate.

28. In a dropping mechanism for corn-planters, the combination of two concentric, rotating, seed-plates having cells adapted to receive and hold single grains, a cut-off overlying the plates, and means for rotating the plates in opposite directions so that the overlying corn will be kept agitated and one of the plates will tend to move the corn away from the cut-off and thus prevent the accumulation of grains at that point.

29. In a dropping mechanism for corn-planters, the combination of a rotating seed-plate having cells to receive and hold the grains, a cut-off overlying the plate, and means for preventing the undue accumulation of grain at the point of cut-off.

30. In a dropping mechanism for corn-planters, the combination of two concentric, rotating seed-plates having cells adapted to receive and hold the grains, and an annular rib or partition between the plates, said rib being formed to prevent the grains lodging thereon and to deflect them into the cells of one or the other plate.

31. A dropping mechanism for corn-planters, comprising a pair of concentrically-arranged seed-plates, each provided with a row of cells adjacent to the row of cells in the other, and means for giving said plates a differential rotation.

32. A dropping mechanism for corn-planters, comprising a pair of concentrically-arranged seed-plates, each provided with a row of cells, and means for rotating said plates, the cells being located so that those of one plate pass in such proximity to those of the other as to assist each other in feeding the grains.

33. A dropping mechanism for corn-planters, comprising two rotating annular seed-plates arranged one within the other and each provided with cells to receive the grains.

34. A dropping mechanism for corn-planters, comprising rotating seed-plates, each having cells to receive the grains, and the cells of each plate adapted to discharge independently of those of the other plate.

Signed by me at Des Moines, Iowa, this 2d day of June, 1902.

ROBERT S. KIRKPATRICK.

Witnesses:
S. C. SWEET,
WEBSTER BISHOP.