No. 779,608. PATENTED JAN. 10, 1905.

R. S. KIRKPATRICK.

DROPPING MECHANISM FOR CORN PLANTERS.

APPLICATION FILED AUG. 25, 1904.

4 SHEETS—SHEET 1.

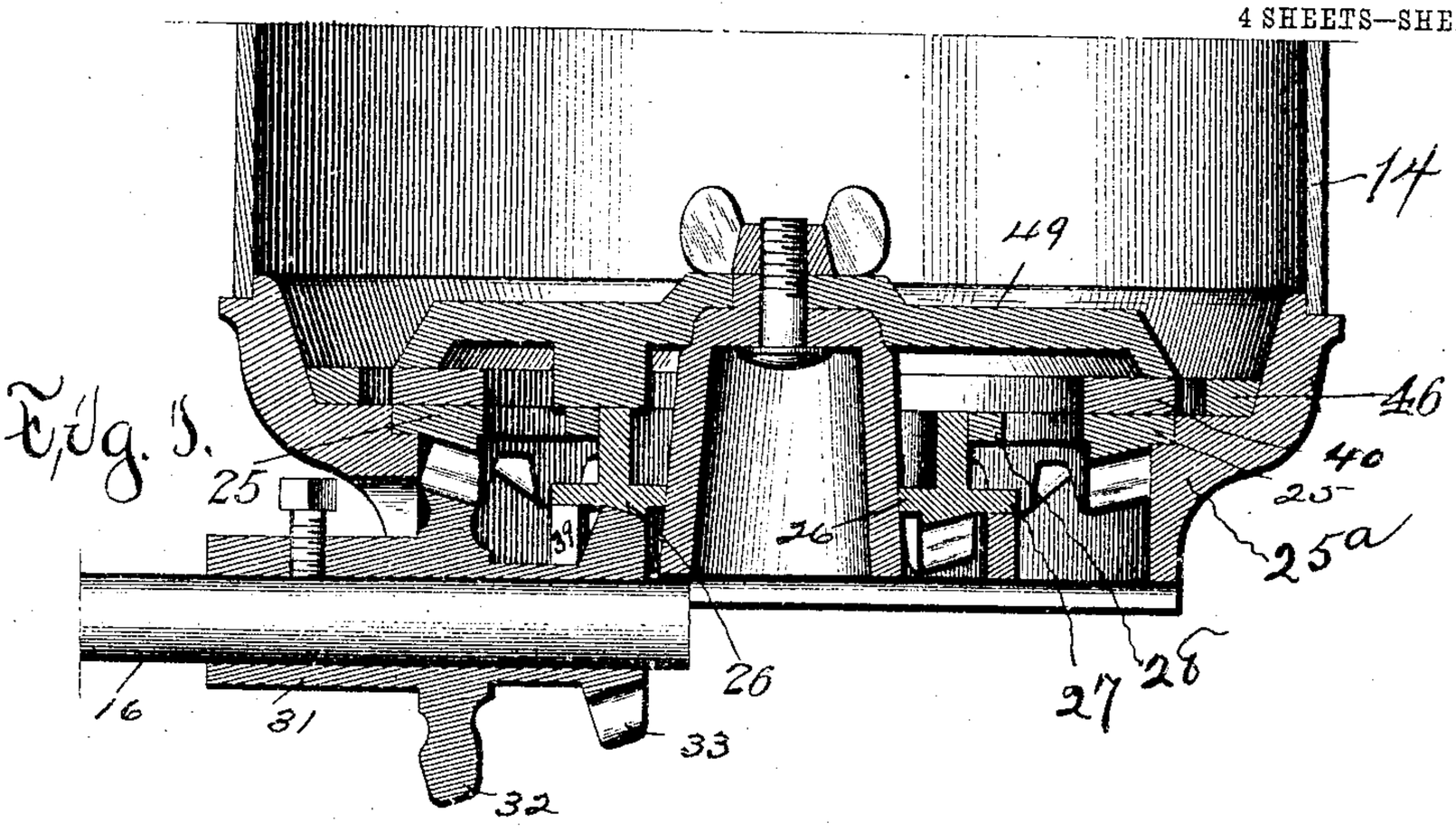

Fig. 1.

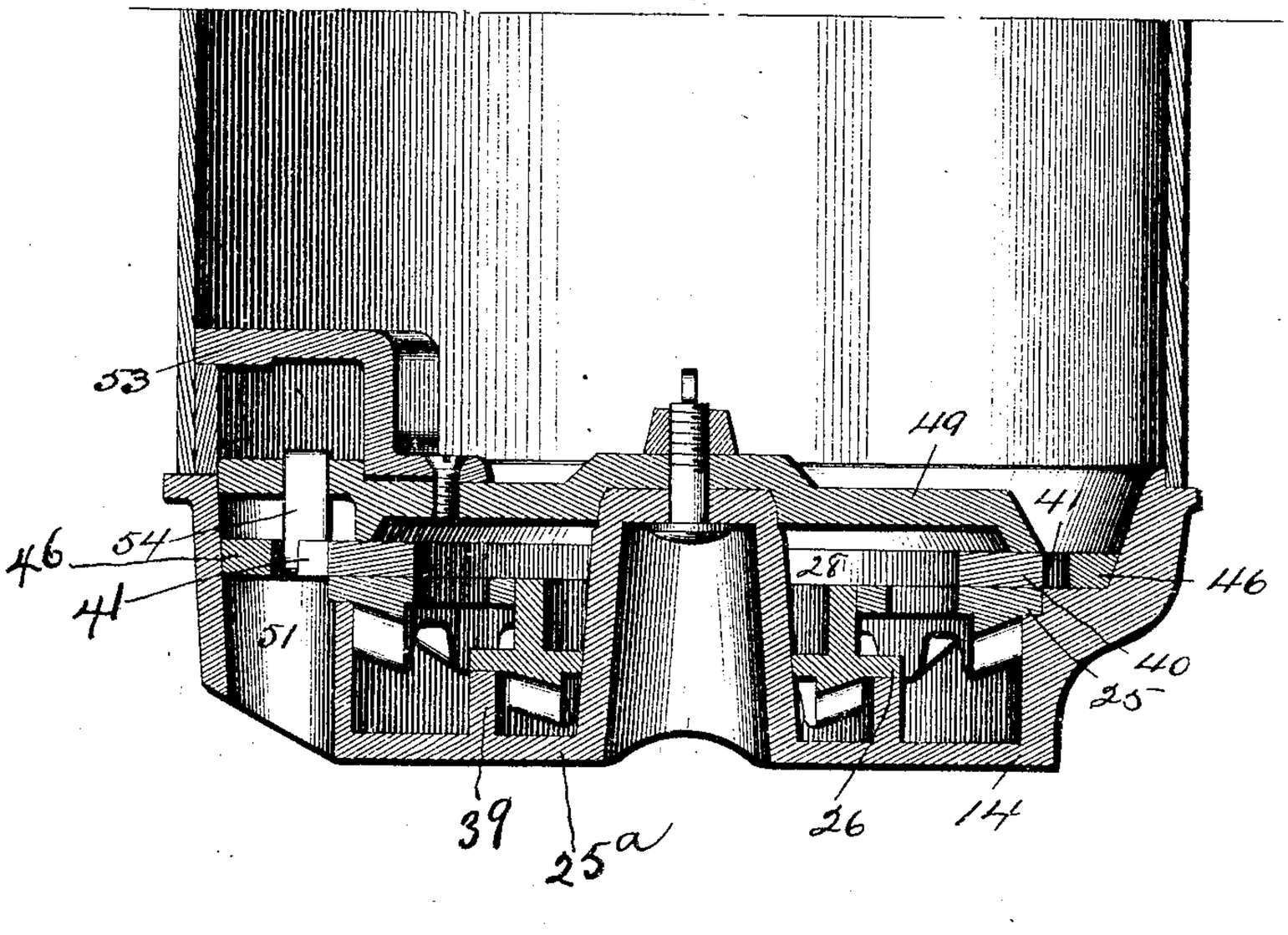

Fig. 2.

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4 SHEETS—SHEET 2.

Fig. 3

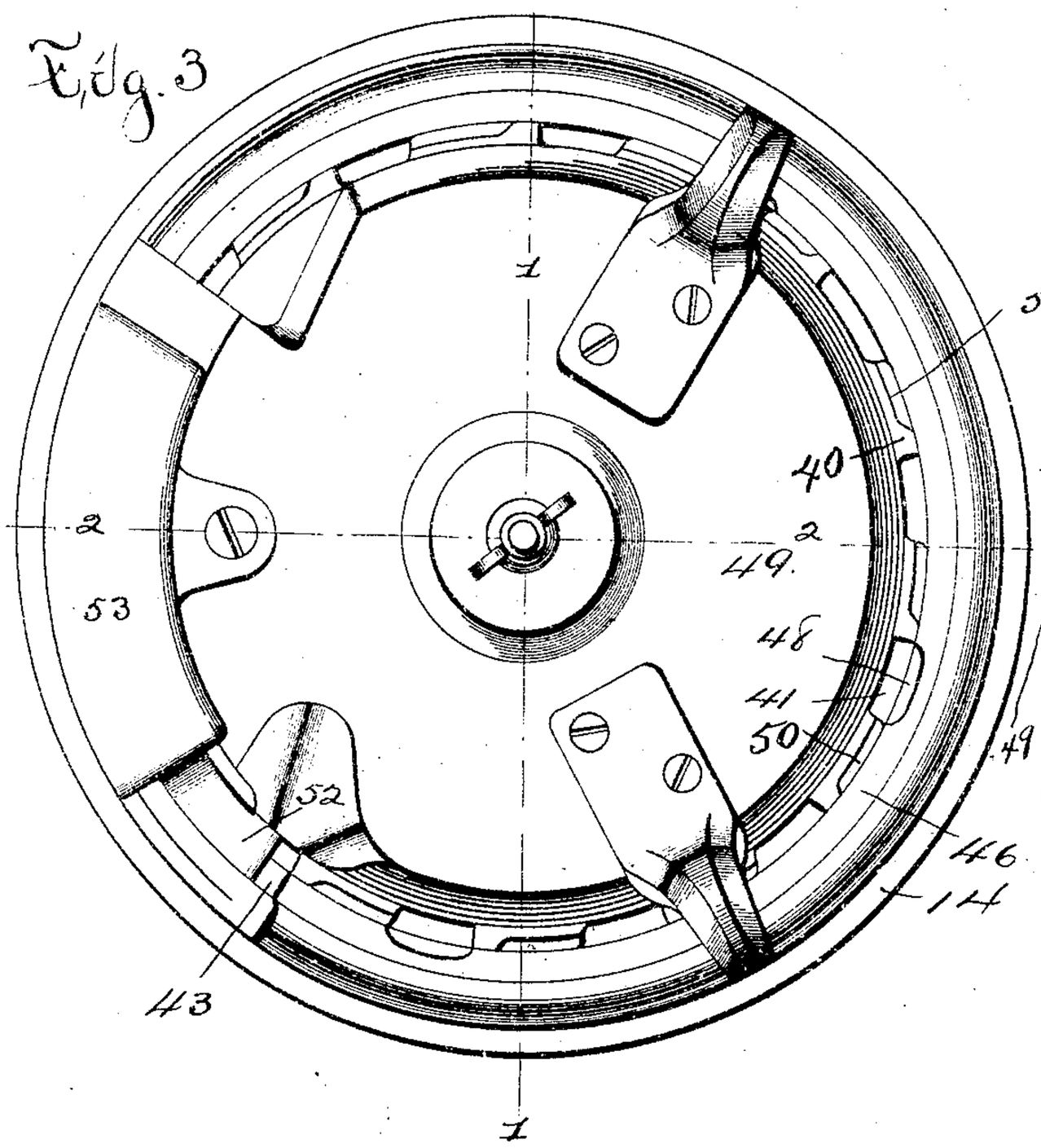
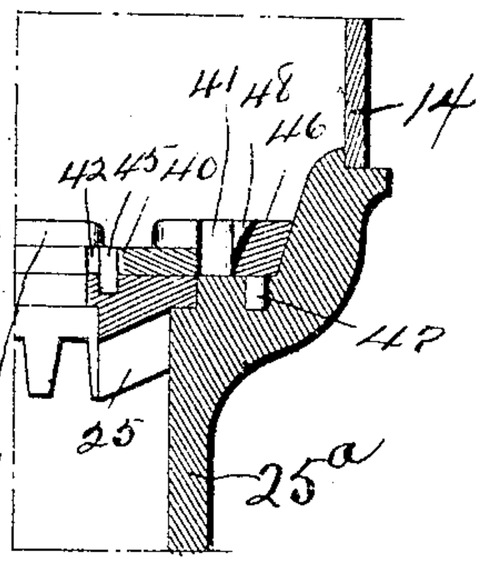


Fig. 4.



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4 SHEETS—SHEET 3.

Fig. 5.

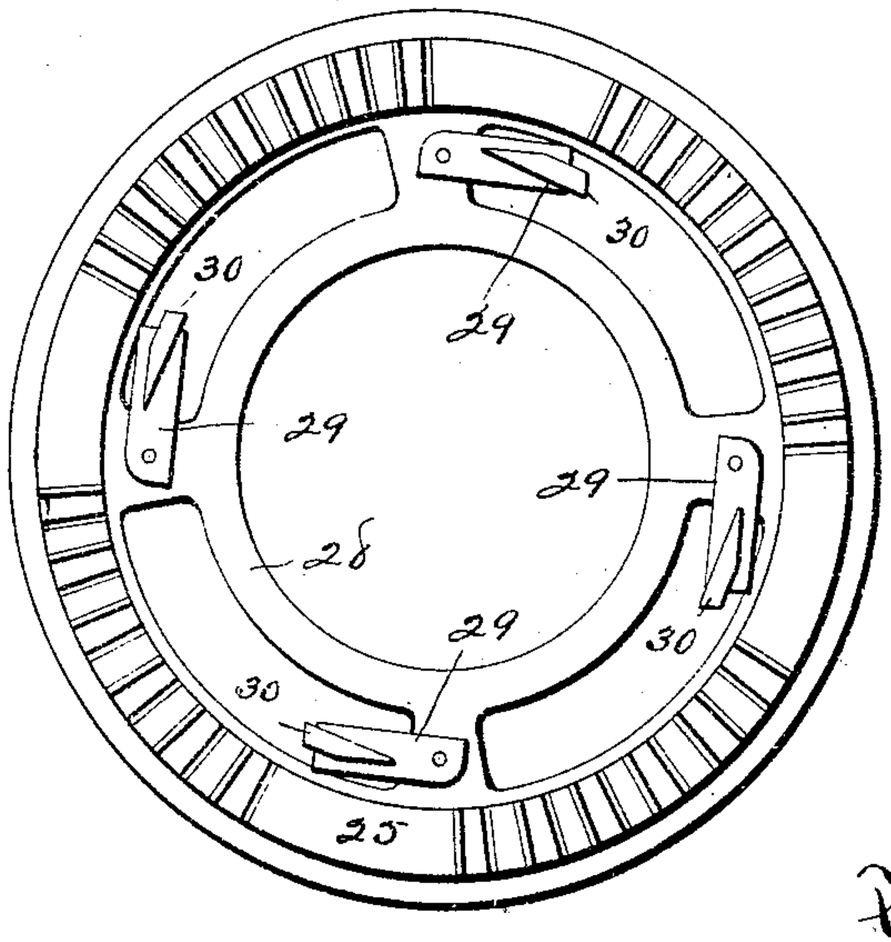


Fig. 7.

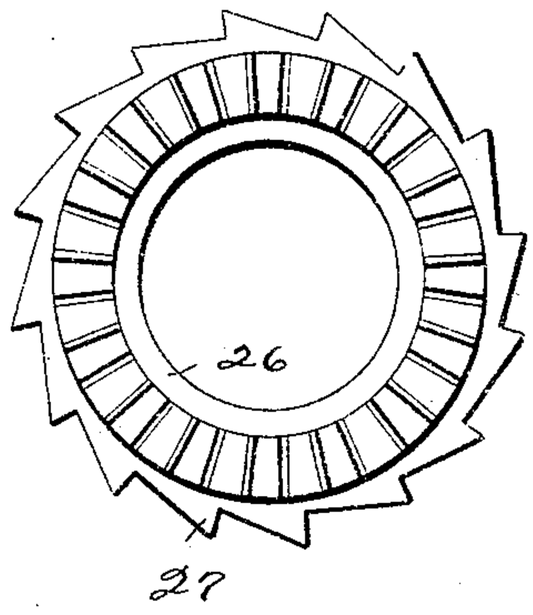


Fig. 6.

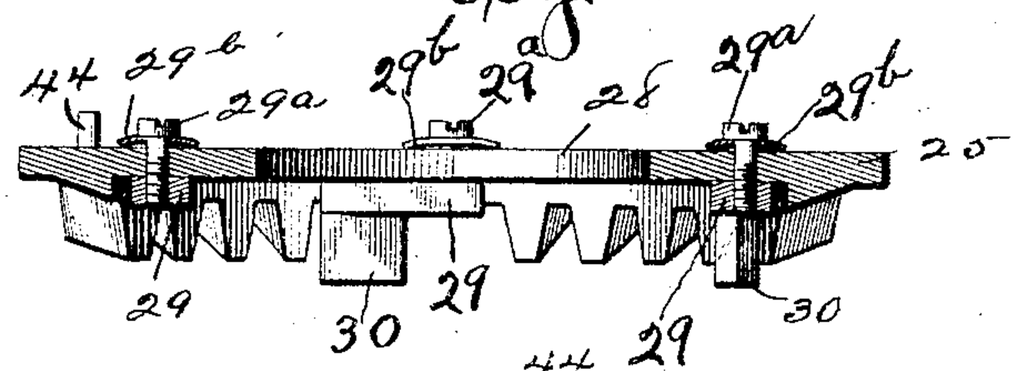
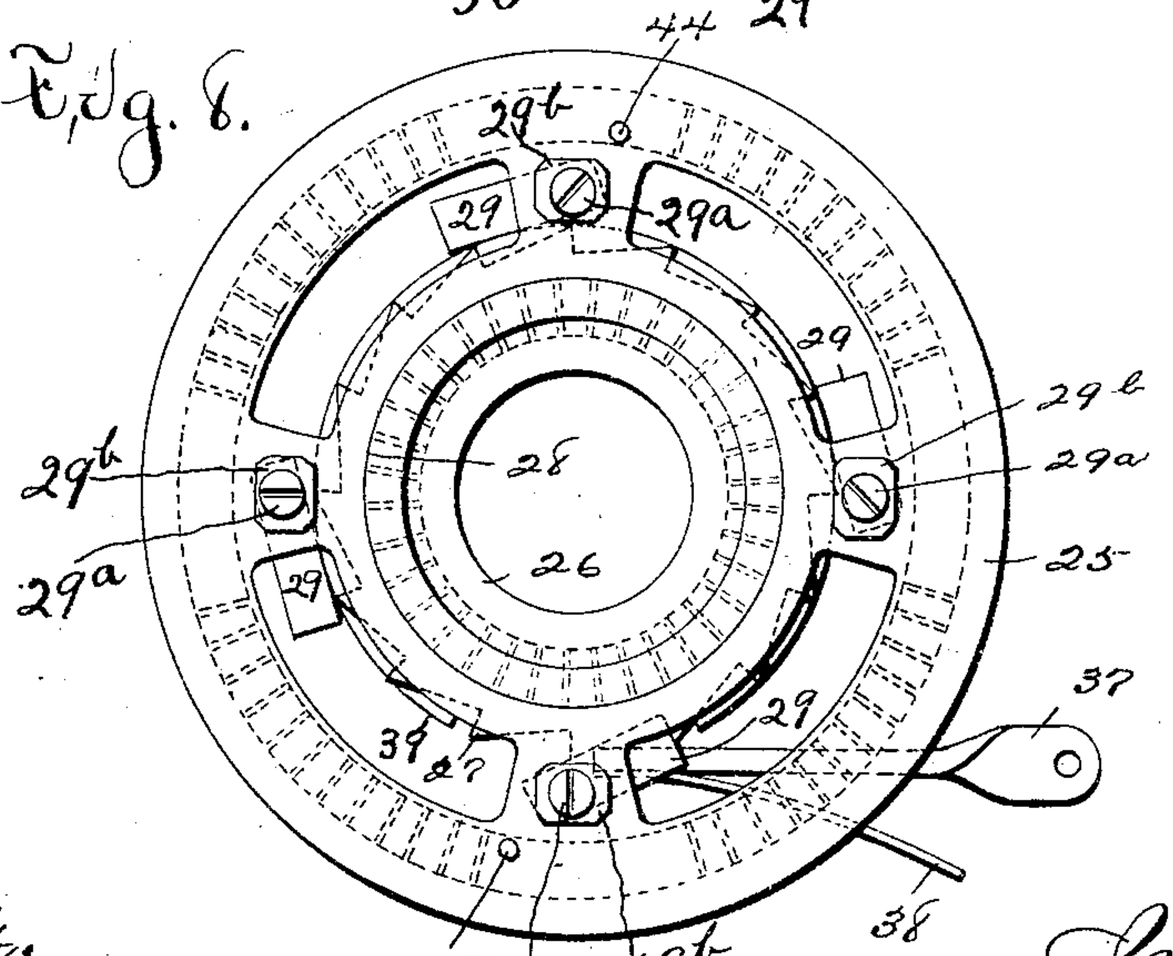


Fig. 8.



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No. 779,608. PATENTED JAN. 10, 1905.

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DROPPING MECHANISM FOR CORN PLANTERS.

APPLICATION FILED AUG. 25, 1904.

4 SHEETS—SHEET 4.

Fig. 9.

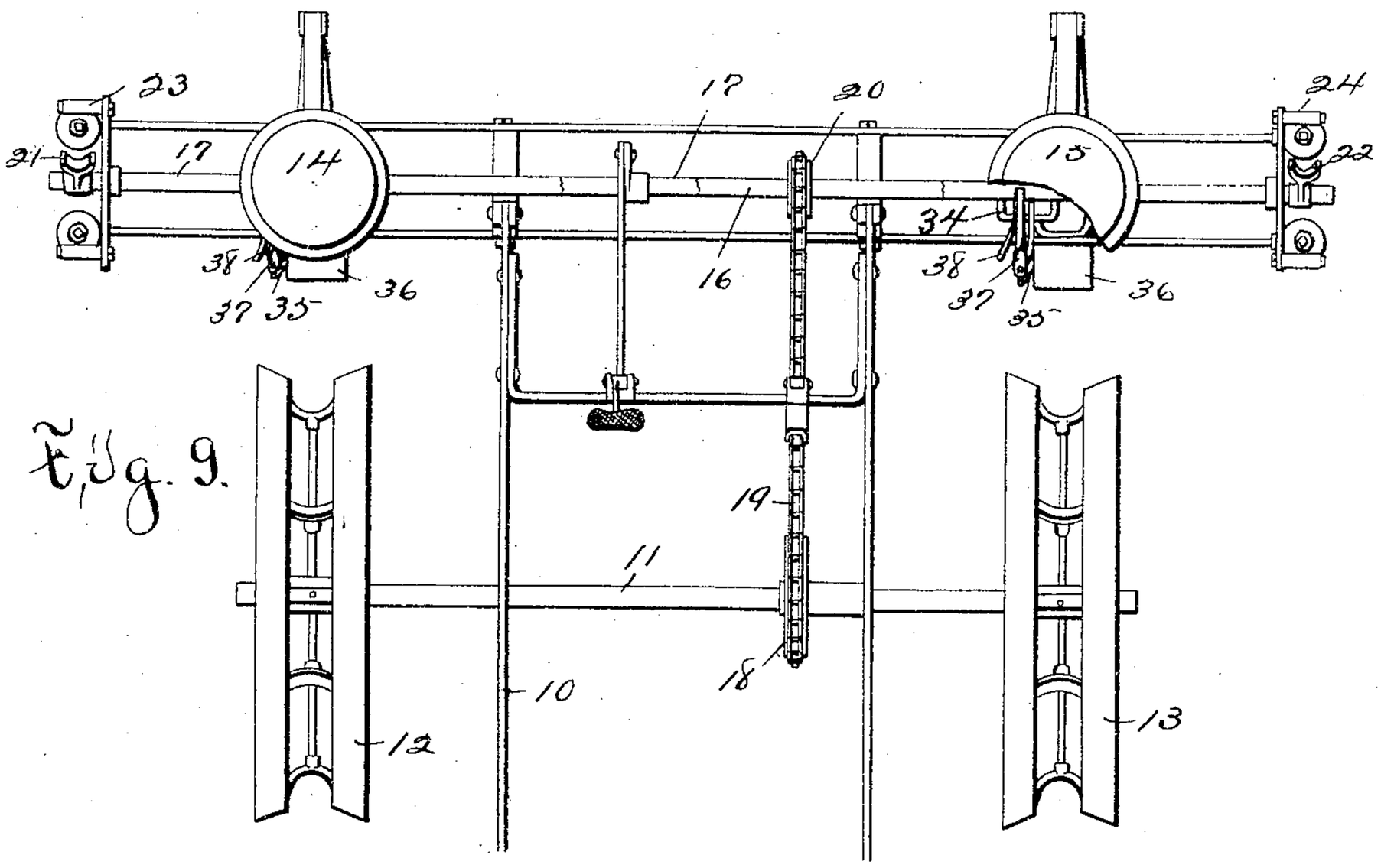


Fig. 10.

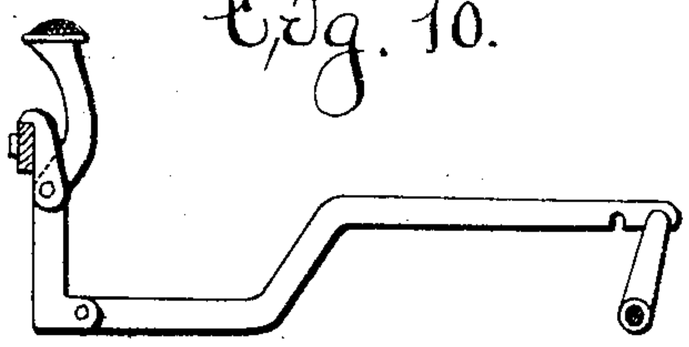
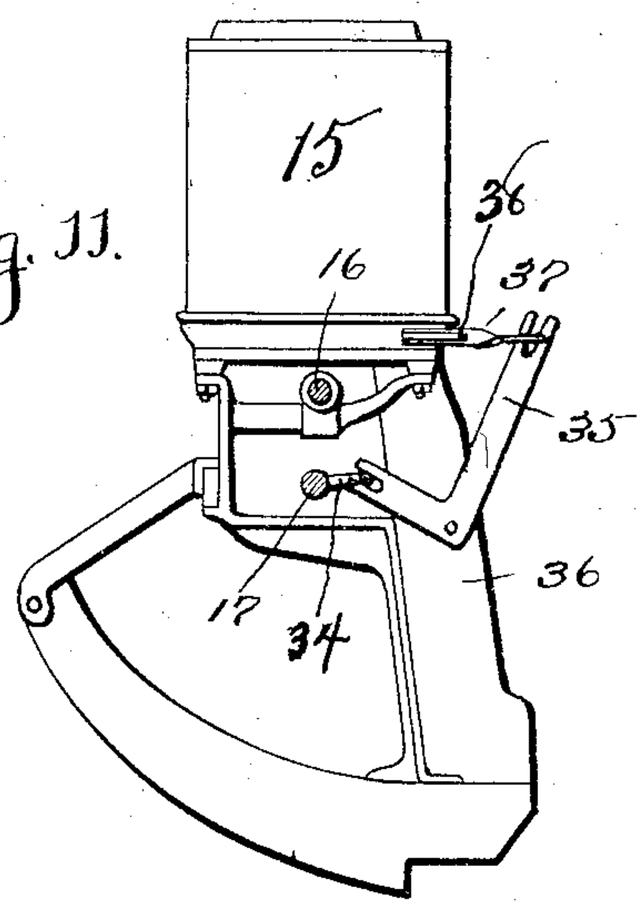


Fig. 11.



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No. 779,608. Patented January 10, 1905.

UNITED STATES PATENT OFFICE.

ROBERT S. KIRKPATRICK, OF DES MOINES, IOWA, ASSIGNOR TO DEERE & MANSUR COMPANY, OF MOLINE, ILLINOIS, A CORPORATION OF ILLINOIS.

DROPPING MECHANISM FOR CORN-PLANTERS.

SPECIFICATION forming part of Letters Patent No. 779,608, dated January 10, 1905.

Application filed August 25, 1904. Serial No. 222,137.

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 invention relates to the dropping mechanism of corn-planters, and particularly to that type where the bottoms of the boxes or other receptacles for holding the corn are provided with revolving plates having cells or pockets or cups into which the grains settle and are received and from which said grains 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 box-bottom. In this type of droppers it is desirable that the mass of corn in the seedboxes be kept agitated in order to facilitate the entry of the grain into the cells, and usually some means other than the seed-plates themselves or some particular projections on the plates has been employed for this purpose. In the present invention, however, flat plates are contemplated, and the necessary agitation of the corn is effected by the actuation of the plates and the movement thereof at different rates of speed and at different times. The plates are carried on and driven by intermittently-operated rings, and said rings are driven, primarily, by a gear connected to the covering-wheels of the planter, and, secondarily, by pawl-and-ratchet connection to a secondary gear connected to said covering-wheels. The gears are of different diameters and actuate the seed-plates with different rates of speed, and the differentiation or transfer of the application of motion to the plates is abrupt and sudden and possessed of a changeful and jarring function. Preferably the plates are revolved in a series of steps or through the application of alternate motions; but whether or not this manner of operating them is employed a differential of movement keeps the overlying mass of corn moving and facilitates the entrance of the grains into the cells.

The invention also contemplates an arrangement for driving seed-plates from the traction mechanism or covering-wheels of a planter and at intervals suspending the rotation of the seed-plates pending the operation of other mechanism and again establishing the rotation of the seed-plates through the action or operation of a check-wire.

The invention also contemplates an arrangement of a pawl-and-ratchet connection between the traction mechanism of a planter and the seed-plates, which ratchet connection is under the control of a tripping mechanism actuated by a check-wire.

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

Figure 1 is a vertical section illustrating the construction of the dropping mechanism in a single seedbox. Fig. 2 is a vertical section at right angles to the section of Fig. 1. Fig. 3 is a plan of the devices shown in Figs. 1 and 2. Fig. 4 is a vertical section illustrating in detail parts of the mechanism employed. Fig. 5 is an inverted plan of the parts of the mechanism employed detached from the remaining parts. Fig. 6 is a cross-section of the devices shown in Fig. 5. Fig. 7 is an inverted plan of a gear-and-ratchet wheel employed in the device detached from the remaining parts. Fig. 8 is a plan of portions of the mechanism, the dotted lines indicating gear-teeth and ratchet-teeth, one of the driving-pawls in operative position and held by an operating-trigger. Fig. 9 is a diagram illustrating the mounting of the several devices on a planter-frame. Fig. 10 is a detail elevation of a part of the mechanism employed as a foot-drop and also employed for adjustment of the machine. Fig. 11 is a detail elevation illustrating the means employed to effect an operation of the seed-plates through the action of a check-wire.

In the construction of the machine as shown the numeral 10 designates the frame, 11 the axle, 12 13 the driving-wheels, 14 15 the seed-boxes, 16 the dropper-operating shaft, and 17 the check-shaft, of a corn-planter. A sprocket-wheel 18 is rigidly mounted on the axle 11 and rotated thereby is connected by a sprocket-chain 19 to a sprocket-wheel 20 on the shaft 16. Check-heads or forks 21 22 are mounted on opposite end portions of the check-shaft 17, and guides 23 24 for a check-wire (not shown) are mounted on the frame adjacent said check-heads.

All of the parts thus far described are common and well known in this art and may be of any desired and suitable construction, and I proceed with the description of the mechanism with the common understanding that the shaft 16 may be rotated continuously through its sprocket connection with its axle 11, and the check-shaft 17 may be oscillated intermittently through an engagement of a check, knot, or tappet on the check-wire with one or another of the check-heads 21 22.

A gear-ring 25 is mounted in the bottom portions 25[a] of each of the seedboxes 14 15 and is arranged for rotation in said bottom on a vertical axis. The teeth of the gear-ring 25 depend from its lower surface and are mitered or beveled. A gear-ring 26 is mounted within and concentric with the gear-ring 25 in each of the seedboxes 14 15, and the teeth thereof depend from its lower surface on the same bevel or incline as the teeth of the first ring. Ratchet-teeth 27 also are formed on the rim of and project radially from the gear-ring 26. The upper faces of the rings 25 26 are flush with each other, Figs. 1 and 2. A frame or spider 28 is formed on and inside of the gear-ring 25, and pawls 29—in this instance four in number—are pivoted on said frame and are arranged to engage at times with one or another of the ratchet-teeth 27 on the wheel 26. Each of the pawls 29 is pivoted on a bolt 29[a], extending through the frame or spider 28 loosely and seated in the pawl, and a leaf-spring 29[b] is interposed between the head of said bolt and the top of said frame, Fig. 6. Thus is the pawl yieldingly mounted on the frame and spring-held under a tension which normally retains it in whatsoever position of oscillation it may be placed and compensates for the wear caused by repeated oscillation. A shoulder or lug 30 is formed on and depends from each of the pawls 29. The gear of the ring 25 is mutilated by arranging the teeth thereof in similar groups, each group spaced apart a considerable distance from its neighbors, while the gear on the ring 26 is continuous. A collar 31 is mounted rigidly on the shaft 16, and bevel-gears 32 33 are provided on said collar. There is a collar and bevel-gears provided for each of the seed-boxes 14 15. The bevel-gear 32 normally meshes with the teeth of the gear-ring 25, and the bevel-gear 33 meshes with the teeth of the gear-ring 26. Since the shaft 16 is driven continuously in one direction, as above noted, the gear-wheel 32 will drive the gear-ring 25 so long as its teeth find teeth of said gear-ring with which to engage; but when one of the spaces between groups of teeth on said gear-ring is reached said gear-wheel travels idly in respect of the ring. The gear-wheel 33 drives the gear-ring 26 and ratchet thereon continuously; but the gear-ring 26 is normally and ordinarily detached from the gear-ring 25. In its travel the gear-ring 25 carries the pawls 29 in an orbit and held out of engagement with the ratchet-teeth 27 on the gear-ring 26 by a flange or notched abutment 39 on the base 25[a], and when said ring 25 stops said pawls are out of engagement with the ratchet-teeth. A crank-arm 34 is formed on and extends laterally from the check-shaft 17, and a lever 35, fulcrumed on a standard 36, is provided with a fork on one end embracing said crank-arm. The end portion of the lever 35 opposite the crank-arm 34 carries a trigger or arm 37, which is provided with a leaf-spring 38, fixed at one end to the forward end of the trigger or arm and diverging rearwardly therefrom. Upon an oscillation of the check-shaft 17, due to the engagement of a knot, check, or tappet of the check-wire with the head 21 or 22, as above noted, the crank-arm 34 is depressed and acts on and oscillates the lever 35. The movement of oscillation of the lever 35 effects an inward forward movement of the trigger or arm 37 rectilinearly through a notch in the base 25[a] and causes said trigger or arm to engage a lug 30 on one or another of the pawls and move said pawl laterally into engagement with one or another of the ratchet-teeth 27, as illustrated by dotted lines in Fig. 8, the arm 37 being held in line and given a lateral support or backing by engagement of the spring 38 in said notch. Thus it will be observed that although the gear-ring 25 stops by reason of its mutilation to permit the dropping of an accumulation of corn from the spout or standard 36 without further addition to such accumulation on an operation of the trigger 37 as described, the gear-ring 26 (driven continuously by the gear 33 and acting through its ratchet-teeth, the pawl engaged thereby, and the frame 28) effects a further rotation of the gear-ring 25 and drives such gear-ring at reduced speed past its mutilation and into sudden, rapid, and jarring successive and reëstablished engagement with the gear-wheel 32. The pawl 29 is released from the ratchet-teeth in its further travel by contact with the notched flange or abutment 39 after the contact of the gear-ring 25 with the gear-wheel 32 is reëstablished, and the trigger 37 and spring 38 are withdrawn through a reverse movement of the oscillating check-shaft under the influence of springs

provided to effect such movement in all planters of this type.

I have described means for rotating the gear-ring 25 by gearing to the traction mechanism of the planter and stopping such rotation through mutilation of such gear-ring, thus providing for intermittent operation and rotation of said gears. Such stopping of the gear-ring is provided to admit of the dropping of a hill or accumulation of corn from the spout or standard 36 by the check-wire without adding to such hill or accumulation, as would be the case if the gear-ring 25 continued its rotation. I also have described means for reëstablishing the rotation of the gear-ring 25 immediately following the dropping of the accumulation or hill of corn by the check-wire, and it is believed the operation of the reëstablishing means by the check-wire is obvious.

I turn now to a description of the construction and operation of the seed-plate.

A seed plate or ring 40 is provided and is formed with a plurality of elongated cells, pockets, or seats 41 in its rim. The elongated cells, pockets, or seats 41 are provided of such size, shape, and location as is best adapted to receive single or individual kernels or grains of corn edgewise, and the plate 40 rests on the upper surface of the gear-ring 25 and is provided with notches 42 on its inner margin, which notches embrace and engage with lugs 44 45 on said gear-ring in order that the seed-plate may be rotated by the gear-ring and coincident therewith. A filling-ring is provided and is located in the space between the perimeter of the plate 40 and the inner surface of the lower portion or base 25^a of the seedbox. The filling-ring is held against rotation in either direction by a pin 47 engaging a seat in the seedbox. The inner margin or surface of the filling-ring 46 is uniformly smooth save and except that notches, recesses, or concavities 48 are formed therein at intervals by beveling one edge thereof. Such recesses or concavities, as 48, are provided in the filling-ring 46 to facilitate the entrance of grains or kernels of corn edgewise in the seed seats, cells, or pockets 41 and may be few or great in number, according to the desire of the user and the quality of seed used in the machine. A cap-plate 49 is provided and covers the central portion of the bottom 25^a of the seedbox and overlies the inner margin of seed-plate 40. The perimeter of the cap-plate 49 is beveled, as is also the inner surface of the base of the seedbox surrounding said cap-plate, thus forming a converging annular groove or channel above the cells or pockets of the seed-plate to facilitate the entrance of kernels or grains of corn edgewise in the pockets. The upper outer edge of the seed-plate 40 may be chamfered or beveled at intervals to provide inclines 50 to further facilitate the entrance of the kernels or grains of corn edgewise to the cells or pockets and also to serve as agitators to stir and prevent packing of the corn on the seed-plate. It will be observed that the cells 41 are arranged to travel in an orbit intersected by an aperture 51 through the bottom plate of the seedbox. Hence in one complete revolution of the seed-plate 40 each of the cells 41 is brought into successive registration with the aperture 51 for the delivery of a single kernel or grain of corn to the spout or standard 36. It is desirable to cover the aperture 51, leading to the standard or spout 36, and the seed cups or cells which may momentarily be positioned above said aperture in order that the free and unobstructed delivery or discharge of the seed-corn from the box to the spout or standard may be avoided. To this end I have provided a cut-off 52 over the marginal portion of the seed-plate 40. This cut-off 52 is pivoted at its inner end on a pin whose outer end is secured in the wall of the seedbox and whose inner end is fixed to an ear-plate 53, fixed to and rising from the cap-plate 49. It is the function of the cut-off 52 to shear off or remove the surplus grains of corn from the upper surface of the seed-plate 40 just before the cells deliver their grains through the aperture 51 to the spout or standard and at the same time obstruct the passage of more than one grain at a time in each cell or notch of the plate, and a lug 43 on the filling-ring also obstructs the passage of more than one grain at a time beneath the cut-off. A knocker 54 of the usual construction is mounted beneath the ear-plate 53 and successively engages in the cells 41 as they pass over the aperture 51 and knocks the kernel or grain of corn from each cell into the spout or standard.

What I claim as my invention is—

1. A dropping mechanism for corn-planters, comprising a gear-ring, means for driving said gear-ring continuously, a mutilated gear-ring, means for driving said mutilated gear-ring intermittently, and means for connecting said gear-rings intermittently.

2. A dropping mechanism for corn-planters, comprising a gear-ring arranged for continuous rotation, a mutilated gear-ring arranged for intermittent rotation and intermittently-operated connections between said gear-rings.

3. A dropping mechanism for corn-planters, comprising a gear-ring arranged for continuous rotation, a mutilated gear-ring arranged for intermittent rotation, a seed-plate carried by the mutilated gear-ring, and intermittently-operated connections between said gear-rings.

4. A dropping mechanism for corn-planters, comprising a continuously-rotating gear-ring, an intermittently-rotating gear-ring, a seed-plate driven by said intermittently-operated gear-ring, and intermittently-operated connections between said gear-rings.

5. A dropping mechanism for corn-planters, comprising a continuously-rotating gear-ring, an intermittently-rotating gear-ring, a seed-plate driven by said intermittently-operated gear-ring, and connections between said gear-rings.

6. A dropping mechanism for corn-planters, comprising a gear-ring arranged for continuous rotation, a mutilated gear-ring arranged for intermittent rotation, a seed-plate on the mutilated gear-ring, and intermittently-operated ratchet-and-pawl connections between said gear-rings.

7. A dropping mechanism for corn-planters, comprising a gear-ring arranged for continuous rotation, a gear-ring arranged for intermittent rotation, a seed-plate driven by the latter gear-ring, a tappet-actuated lever, a ratchet and pawl, whereby the tappets on a check-wire shall control the engagement of the pawl with the ratchet and connect said gear-rings, said seed-plate operating for an invariable, predetermined interval after one tappet has acted on the lever and before the following tappet acts thereon.

8. A dropping mechanism for corn-planters, comprising a seed-plate, mutilated gear mechanism, ratchet-and-pawl mechanism controlling said mutilated gear mechanism, a tappet-actuated lever and a trigger on said tappet-actuated lever and arranged for engagement with and operative positioning of said pawl.

9. A dropping mechanism for corn-planters, comprising a gear-ring mounted for continuous rotation, a gear-ring mounted for intermittent rotation, a seed-plate on the latter gear-ring, pawl-and-ratchet connections between said gear-rings, tappet-actuated mechanism for connecting the pawl with the ratchet, and means for driving said gear-rings.

10. A dropping mechanism for corn-planters, comprising gear-rings, connections between said gear-rings, a seed-plate on one of said gear-rings, and means for driving said gear-rings.

11. A dropping mechanism for corn-planters, comprising gear-rings, connections between said gear-rings, a seed-plate on one of said gear-rings, a cut-off acting on said seed-plate, and means for driving said gear-rings.

12. A dropping mechanism for corn-planters, comprising a gear-ring mounted for continuous rotation, a mutilated gear-ring mounted for intermittent rotation, a seed-plate on said mutilated gear-ring, pawl-and-ratchet connections between said gear-rings, and tappet-actuated mechanism for operatively positioning said pawl-and-ratchet mechanism.

13. A dropping mechanism for corn-planters, comprising disconnected gear-rings, one of which is mutilated, rigidly-connected gears independently meshing with said rings, a seed-plate on said mutilated ring, and tappet-actuated pawl-and-ratchet mechanism for connecting said rings.

14. A dropping mechanism for corn-planters, comprising gear-rings, one of which is mutilated, a seed-plate on the mutilated ring, pawl-and-ratchet connections between said rings, tappet-actuated lever mechanism acting on said pawl-and-ratchet connections, and rigidly-connected gears meshing with said rings.

15. A dropping mechanism for corn-planters, comprising a gear-ring, means for intermittently rotating said gear-ring, a seed-plate mounted on said gear-ring and driven thereby, and a removable filling-ring mounted concentric with said seed-plate.

16. A dropping mechanism for corn-planters, comprising a mutilated gear-ring, means for intermittently rotating said gear-ring, a seed-plate mounted on said gear-ring and driven thereby, and a removable filling-ring mounted concentric with said seed-plate.

17. A dropping mechanism for corn-planters, comprising a gear-ring, a seed-plate detachably mounted on said ring and driven thereby, and a removable filling-ring mounted concentric with the seed-plate.

Signed by me at Des Moines, Iowa, this 12th day of September, 1903.

ROBERT S. KIRKPATRICK.

Witnesses:
S. C. SWEET,
HENRY H. GRIFFITHS.