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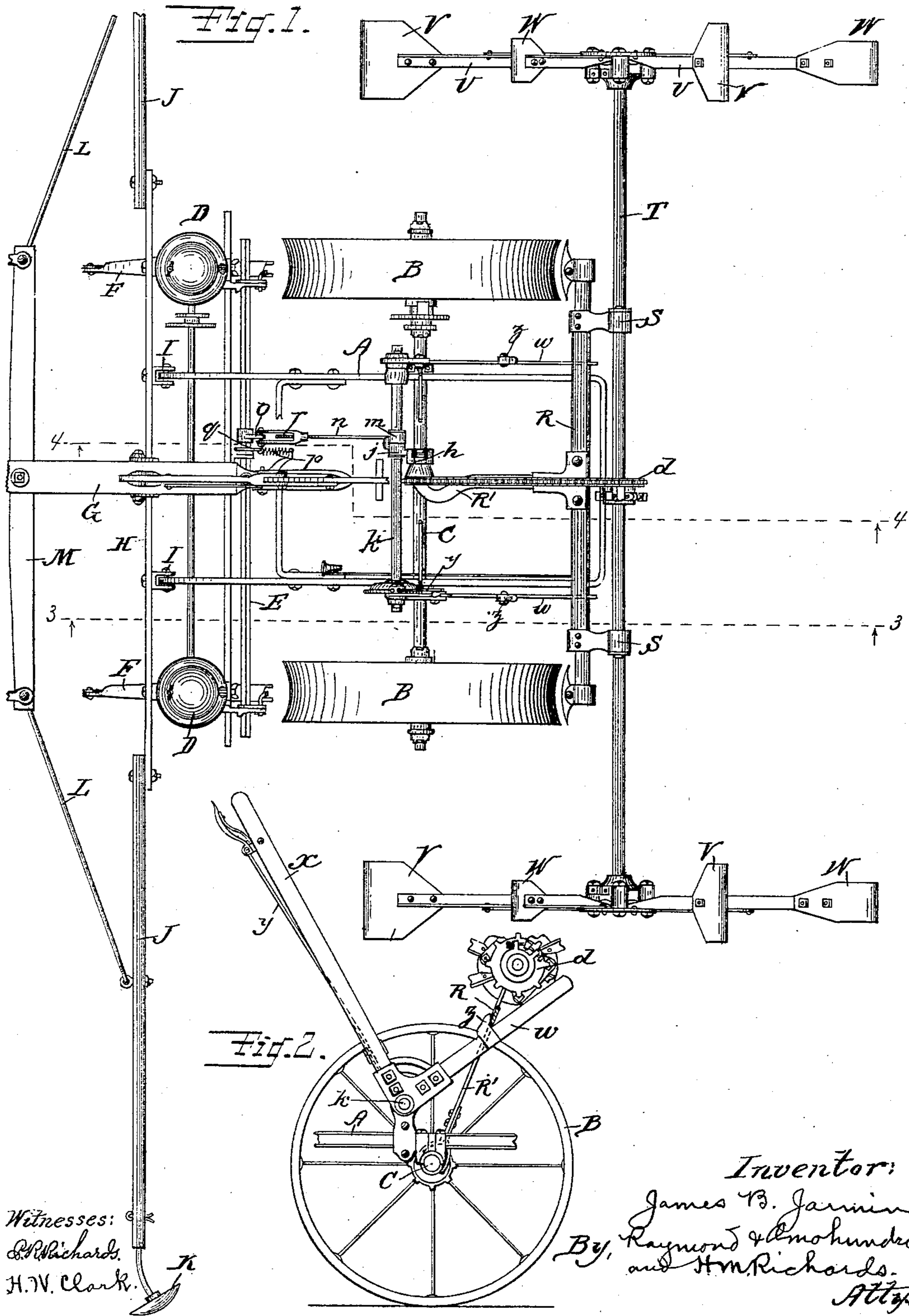
Patented Aug. 15, 1899.

J. B. JARMIN.
AUTOMATIC CORN PLANTER.

Application filed June 5, 1899.)

(No Model.)

3 Sheets—Sheet 1.



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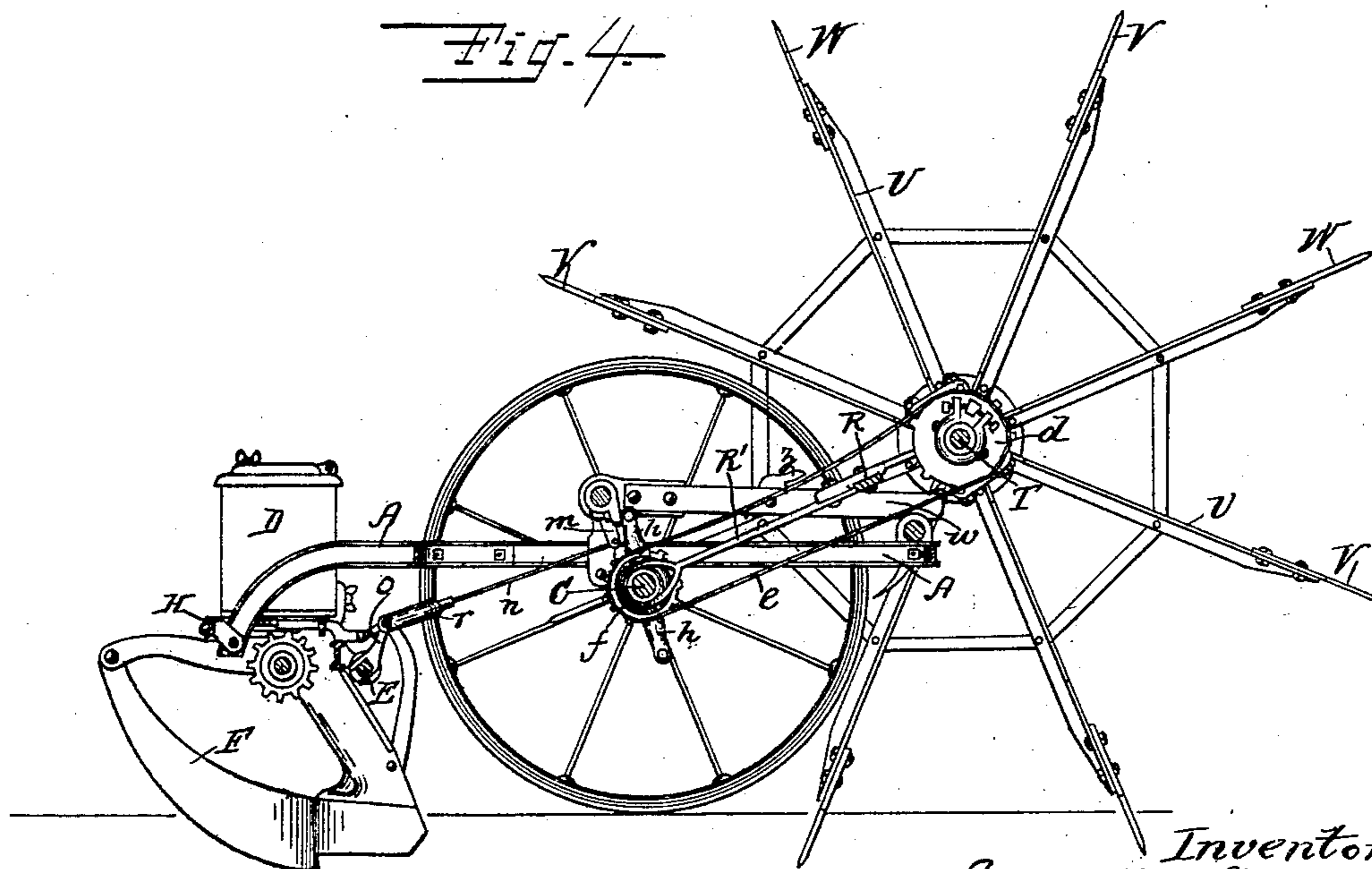
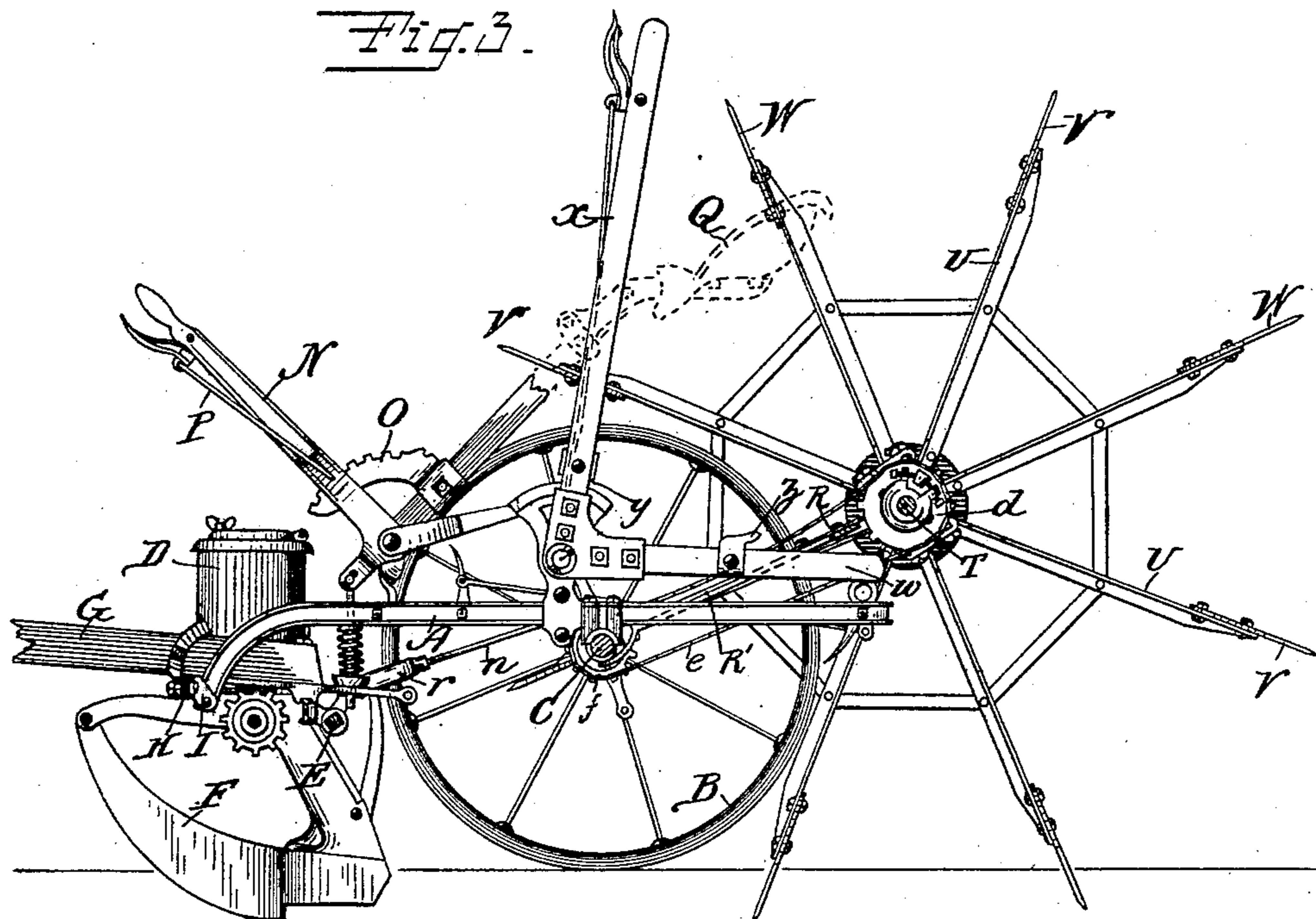
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3 Sheets—Sheet 2.



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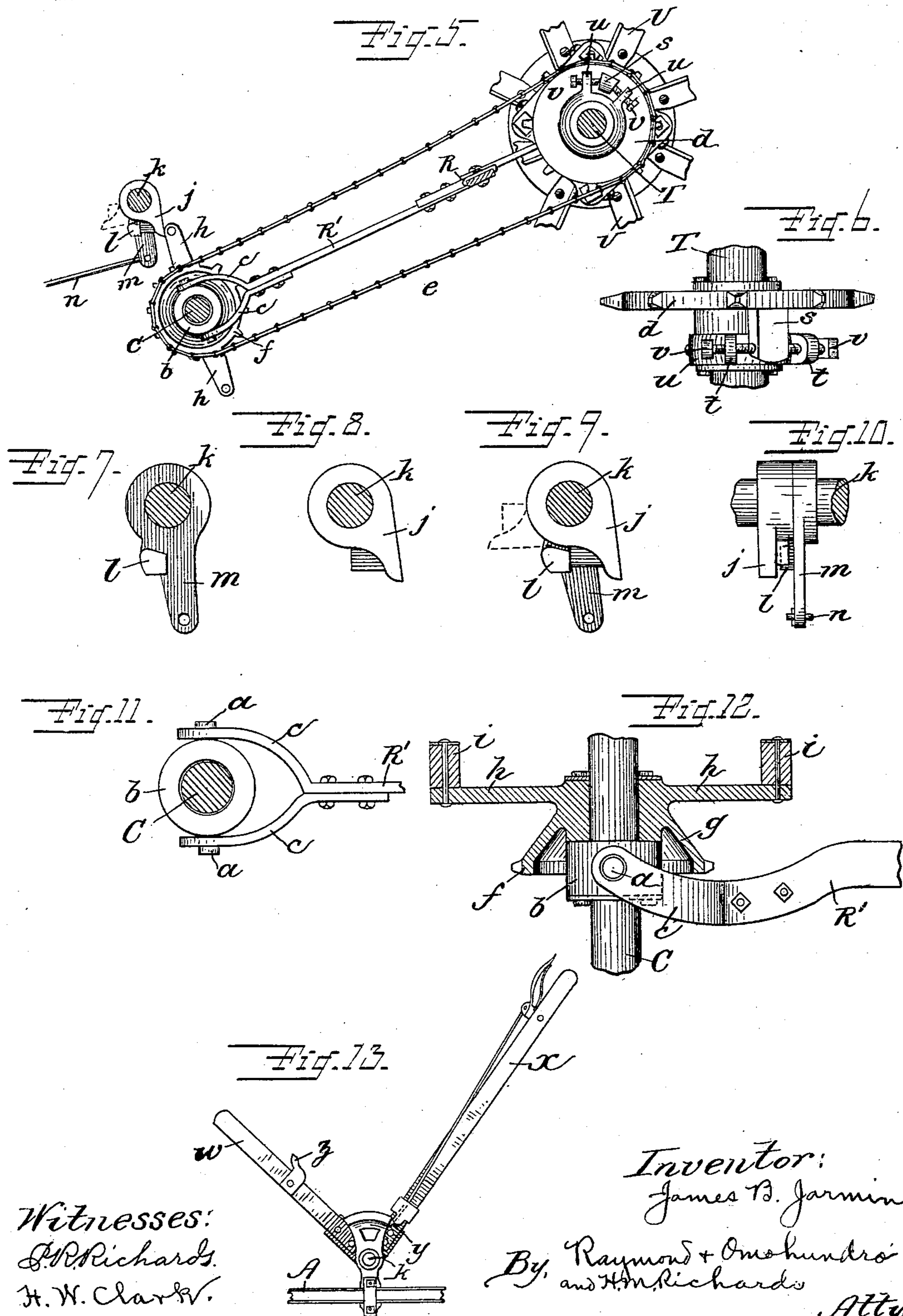
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3 Sheets—Sheet 3.



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UNITED STATES PATENT OFFICE,

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AUTOMATIC CORN-PLANTER.

SPECIFICATION forming part of Letters Patent No. 630,890, dated August 15, 1899.

Application filed June 5, 1899. Serial No. 719,484. (No model.)

To all whom it may concern.

Be it known that I, JAMES B. JARMIN, a citizen of the United States, residing at Osceola, in the county of Polk and State of Nebraska, have invented certain new and useful Improvements in Automatic Corn-Planters, of which the following is a specification.

This invention relates to improvements in automatic corn-planters of the check-rower type, in which the seed-dropping mechanism is operated by check-rower devices carried upon a frame independent of the ground or carrying wheels of the machine. Machines of this class in the prior art have encountered numerous difficulties because of their peculiar constructions, which have rendered all such machines failures when subjected to the conditions of practical use. Among these difficulties are the side draft to which the check-rower frame is subjected, due to the point and manner of connection of the check-rower frame with the planter-frame, as the result of which when the driving is crooked the check-rower frame is thrown to one side or the other of the line of travel of the machine and of course cannot track when thrown to one side by such driving. Furthermore, the character and disposition of the check-rower frames and markers of the prior art are such that it is almost impossible to commence proper checking at any part of a field where the markers have been raised clear of the ground to pass around some obstruction, because there is no means of readily determining the exact checking marker-arm, which thus leaves the matter largely to the guesswork of the driver. Furthermore, in such prior machines sole dependence is placed upon the ordinary marker, which may be a runner or a wheel, for determining the path of travel of the planter back and forth across the field, and as such mark must necessarily be more or less irregular as a result of the more or less crooked driving and the driver must be guided by such mark because the prior automatic check-rower attachments cannot be observed by the driver during the operation of the machine great irregularity in the planting results both in the relative positions of the dropped seed in adjacent rows

as well as the distance between the rows. A still further objection to the automatic check-rowers of the prior art is that there is no assurance that the check-rower frame when dropped will land in position square with the planter for commencing operations, and, indeed, with all constructions known to me the probabilities are that it will land at an angle to the planter and require shifting and adjusting by hand in order to bring it in proper position to commence planting at the commencement of each row.

My invention has for its primary object the correction and avoidance of all of these difficulties by the provision of a planter of simple construction and mode of operation which can be perfectly operated to perform all of its functions, whether in crossing a field, turning at the end of a row, or commencing planting at any part of a row, by the driver without leaving his seat.

Another object is to attach the check-frame to the machine in such manner and at such point that it will be relieved of all side draft, and hence will be unaffected by the swerving of the machine due to crooked driving and that will continue to check perfectly notwithstanding such crooked driving, that the connection between the check-frame and the planter-frame will have such flexibility that the check-rower markers will be free to rise and fall or adapt themselves independently to the unevenness of the ground, high and low places, roots, and other abnormal obstructions.

Another object is to have such disposition of the check-rower frame that the marker-blades thereof will be caused to retrace their steps during their passage back and forth across a field, and thus effectually insure accuracy in the dropping of the corn as well as regularity in the distance apart of the hills of each row and of those in one row from those of the next adjacent rows.

Another object is to have the check-row markers so disposed and of such character that the operator may readily and at all times determine the exact point at which the dropping of the seed will take place, so that in starting a new row or in starting a new sec-

tion of a row where a break has necessarily occurred the machine will not get out of check under these or any other circumstances.

A further object is to insure the dropping of the check-row attachments square with the planter whenever it is raised from the ground, notwithstanding the planter-frame may be at an angle to the check-row frame when the latter is raised from the ground, as at the end of a row, where careless driving may cause the planter to swerve out of line with the check-row attachments.

These and such other objects as may hereinafter appear are attained by the devices illustrated in the accompanying drawings, in which—

Figure 1 represents a top plan view of a planter embodying my invention. Fig. 2 represents a side elevation of a portion thereof, more particularly showing the means for raising and lowering the check-rower frame. Fig. 3 is a vertical section through the planter on the line 3 3 of Fig. 1, looking in the direction indicated by the arrows. Fig. 4 is a view similar to Fig. 3 on the line 4 4 of Fig. 1, looking in the direction indicated by the arrows. Fig. 5 is an enlarged detailed section through the driving mechanism from the check-rower to the seed-dropping mechanism. Fig. 6 is a plan view of a portion of the driving mechanism attached to the check-rower shaft. Figs. 7, 8, 9, and 10 are detailed views of the cam struck by the tappet to operate the seed-dropping mechanism. Figs. 11 and 12 are detailed views showing the manner of connecting the check-rower frame to the planter, and Fig. 13 is a detailed view of the lifting-arm.

Similar letters of reference indicate the same parts in the several figures of the drawings.

Referring by letter to the accompanying drawings, A indicates the planter-frame, B the usual ground-wheels, C the axle thereof, D the seedboxes, E the rock-shaft for operating the seed-dropping mechanism, and F the runners or furrow-openers, all of which may be of any usual or desired construction, as they do not form a part of my invention, except as they cooperate with the novel features of my invention in the manner herein-after described.

The tongue G is secured to the center of the planter-frame at the forward side thereof in any suitable manner, and secured to the under side of the same is a transverse bar H, extending slightly beyond the ground-wheels of the planter, to the frame of which the said bar is pivotally attached, as shown at I, and to the ends of said bar are pivotally secured bars J, carrying upon their outer ends the usual marker-wheels K, said bars J being connected at their centers of length by the rods L with the ends, respectively, of the double-tree M, which affords the necessary draft on said bars for dragging the marker-wheels across the field. I have shown in the drawings one of these marking devices at each

side of the planter for convenience in operation, which devices, by means of suitable cords, may be swung up upon their pivots out of contact with the ground. I claim nothing novel in these marker-arms, and it is immaterial whether a pair of the same be used or the usual and well-known single marker-arm be used instead thereof, pivoted at the center and which can be thrown from one side of the planter to the other in going back and forth across the field. The usual lifting-lever N, notched segment O, and spring-latch P are also provided upon the frame of the planter for convenience in lifting the runners clear of the ground in turning the planter or traveling from field to field, the driver's seat being shown at Q in dotted lines in Fig. 3 in convenient position for manipulating said lifting-lever and the other parts of the planter.

Located back of the axle of the planter is the check-rower attachment, comprising a frame R, preferably formed of a generally T shape, to the ends of a cross bar or head of which are secured bearings S, in which is loosely journaled a cross-shaft T, carrying upon its ends, respectively, a series of marker-arms U, upon the end of which arms is rigidly secured a blade for piercing the ground, the blades on alternate arms being large, as the blades V, while on the intermediate arms the blades W are comparatively small.

For convenience in further description I will designate the arms carrying the blades V as the "spade-arms" or "check-row" arms, as I prefer that the dropping-mechanism should operate to drop the corn whenever one of these spade-arms is in the earth and substantially vertically disposed beneath the shaft T of the check-rower mechanism.

The body portion R' of the check-rower frame I propose to attach to the planter as near as possible to the center of the planter-axle, which is the real center of the planter, and I propose to have such a connection between said frame and the axle as that the connection shall be exceedingly flexible and to all intents and purposes a universal joint. To this end I prefer to have the end of the body portion R' of the check-rower frame curved laterally and bifurcated, as illustrated more clearly in Figs. 11 and 12, and perforated to receive lugs a upon a collar b, loosely sleeved upon the axle C of the planter at a point as near as practicable at the center of length of the axle or midway between the ground-wheels. It will be noted that there is play allowed between the lugs a and the perforations in the bifurcated ends c of the frame-bar R' and between the collar b and the axle C, so that while the connection is essentially a swivel connection this play permits of a universal movement of the parts within prescribed limits; and I may here state that while the connection herein shown and described is the preferred form of connection because of the strength and simplicity thereof, at the same time numerous other forms of

connections may be provided for accomplishing the same purpose without departing from the spirit of my invention.

It will be understood that in the operation of my planter the check-rower frame is lowered, so that the weight thereof is practically entirely supported directly upon the ground, all of the blades thereof piercing the ground, so that as the planter is drawn forward the check-rower attachment in effect walks along over the ground, marking and spacing it with the spades, thus causing the shaft T of such attachment to rotate continuously and uniformly with relation to the distance traveled by the planter. In order to transmit power from this shaft to the seed-dropping mechanism, so that as every spade-arm arrives in position beneath the shaft the seed will be dropped by such mechanism, I mount upon said shaft at its center of length a sprocket-wheel *d*, around which is trained a sprocket-chain *e*, which is also trained around a sprocket-wheel *f*, loosely mounted upon the axle C of the planter, so as to turn independent thereof. This sprocket-wheel *f* is preferably disposed laterally of its hub upon the oblique cone-like web *g*, as shown more clearly in Fig. 12, so as to bring said wheel over the pivot-connection between the bar R' and the collar *b* at the center of the axle C of the planter. From the hub of the sprocket-wheel *f* projects one or more tappets or striker-arms *h*, (two being shown in the drawings,) preferably carrying antifriction-rollers *i* upon the ends thereof, which are adapted and arranged to strike a cam *j*, loosely mounted upon a rock-shaft *k*, suitably journaled upon the frame of the planter above and slightly forward of the axle. The cam *j* is adapted and arranged to engage the projection *l* upon the crank-arm *m*, also loosely mounted upon the rock-shaft *k* adjacent to the cam, so that whenever the cam is struck by one of the tappets in its forward movement it will be thrown against the projection *l*, and thus cause the partial rotation of the crank-arm until the cam is released by the tappet. When the planter is backing, however, or for any reason the direction of rotation of the check-row attachment is reversed, as when it is raised clear of the ground and being adjusted to start planting, at which time it is not desirable to operate the seed-dropping mechanism, the tappets will strike and partially rotate the cam away from the projection *l* without causing any movement whatever of the crank-arm.

The end of the crank-arm *m* is connected by a rod *n* with another crank-arm *o* upon the rock-shaft E of the planter, so that whenever the crank-arm *m* is operated, through the medium of the tappets and cam, a rocking action is given to the shaft E, and through this shaft proper movement is imparted to the seed-dropping mechanism. A spring *p*, secured at its ends, respectively, to a crank-arm *q* upon the shaft E and to a stationary portion of the frame A of the planter, serves

to restore the parts to their normal position when the cam is released by the tappet. For adjusting the throw of the seed-dropping mechanism I provide some device for adjusting the length of the connecting-rod *n*, which device may be an ordinary turnbuckle or it may be a half-turnbuckle or U-shaped strip *r*, the ends of which are bolted to the crank-arm *o* and the center of which is threaded to receive the threaded end of the rod *n*, so that by removing the bolt the coupling may be turned and properly adjusted. In this way means is provided for taking up wear or lost motion in the seed-dropping mechanism or providing for any changes therein which may be necessary, such as an adjustment to insure the dropping of the seed at exactly the right time indicated by the check-row markers.

To provide for variations in the speed driving—that is, more particularly for fast and slow teams—I provide an adjustment between the sprocket-wheel *d* and the shaft T of the check-row mechanism, which is more clearly illustrated in Figs. 5 and 6, whereby the tappets are caused to strike quicker or slower, as the case may be. With this end in view I mount the sprocket-wheel *d* loosely upon the shaft T and provide said wheel with a lateral projection *s*, extending out between two ears *t*, formed upon a collar *u*, rigidly secured to the shaft T. Through these ears are threaded bolts *v*, impinging against the projection *s* upon the sprocket-wheel, so that by turning up one bolt and backing off the other the radial position of the sprocket-wheel with reference to the shaft T may be quickly changed and adjusted to the conditions existing.

A further and more important feature of my invention is the means for raising and lowering the check-row mechanism upon the planter-frame, which consists of a pair of lifting-arms *w*, one of which, with the lock-lever *x*, in effect constitutes a bell-crank lever pivoted at its angle upon a rock-shaft K, journaled in suitable bearings on the frame A of the planter adjacent to the axle-bearings, the arm and lever extending at substantially right angles to each other. The lifting-arms *w* extend rearwardly a sufficient distance so that when rocked upwardly upon their pivot they will engage the cross-bar of the check-rower frame R, and thus with sufficient power applied to the lever *x* they will lift said frame, swinging it upon its pivot connection with its axle until the cross-bar thereof engages the hooks *z* or other suitable projections upon the lifting-arms, about the center of length thereof. At this time the spring-latch *y* of the lock-lever *x* engages a fixed shoulder in a manner obvious and well understood, so as to lock the check-rower frame in elevated position, the same being supported upon the lifting-arms. Obviously when the lock of the lever *x* is released the check-rower frame will be allowed to swing down upon its pivot until the blades thereof

rest upon the ground, the lifting-arms at such time being free from the check-rower frame, so as not to interfere with the movements thereof in planting. By reason of the great flexibility of the connection between the check-rower frame and the axle of the planter and the provision of the rigid lifting-arms engaging the check-rower frame at opposite sides of its pivots whenever the check-rower attachment is raised the engagement of the frame thereof with the stops *z* upon the lifting-arms will square the check-rower attachment with the planter, regardless of the relative positions of the planter and check-rower attachment. At the time the attachment is lifted and obviously when again lowered the check-rower attachment will strike the ground square with the planter and at substantially exact right angles with the line of draft.

It will be observed that the shaft *T* of the check-rower attachment extends a considerable distance beyond or outside of the ground-wheels of the planter, and I propose that this distance shall equal one-half the distance between the ground-wheels of the planter or seed-dropping mechanism, so that the blades of the check-rower attachment will enter the ground on a line substantially parallel with the line of draft of the planter, but at a distance half-way between the row of corn being planted and the next row to be planted. Hence when the planter is turned and is planting back across the field the blades of the check-rower attachment will retrace their steps alongside next the row already planted, and by dropping the check-rower attachment, so that the spade-arms or check-rower blades, which are the broad blades *v*, will enter the marks previously made by the broad blades in planting the adjacent rows, the steps made by the check-rower attachment going in one direction will be retraced by the same set of blades by which they were made in planting in the opposite direction. The smaller blades *W* are simply used as auxiliary blades to assist in insuring a continuous and uniform rotation of the shaft *T*, and of course such small blades will retrace in the holes already made by them in passing back and forth across the field. Should the blades at one side of the planter be lifted by hard soil, roots, &c., the blades at the other side of the planter will not be raised thereby, but, on the contrary, will, for the time being, become the controlling-blades or marker-wheel, the blades of the other wheel being free to run deeper or shallower, as it may be. After the first furrows are made then the spades, dropping into the former spade-marks, become the controlling-spades.

Fig. 1 shows the general arrangement and disposition of the parts of the machine as a whole. The ordinary marker-wheels *K* are extended out to mark the ground one row farther than the check-rower marking or spade wheels, and it will be noticed that the

distance from the planter-tongue to the marker *K* is the same as from one marking or spade wheel to the other of the check-rower attachment, so that when in turning at the end of the field and starting with the tongue of the planter over the guide-mark made by the wheel *K* the spade-wheels at the side of the planter in the direction in which the turn is made are exactly in their old marks.

The accuracy of this dropper arises largely from the blades or marker-wheels of the check-rower attachment being at the sides instead of the rear of the planter, where the driver can see to start, so that the broader spade-arms will enter the old holes made by them, and this is true both in starting at the end of a new row and in taking up a row after an interruption necessarily caused by obstruction in the path of the planter, around or over which the planter must be driven without planting. Crooked driving is the main trouble with the markers of ordinary kinds, as they are always thrown, by their peculiar connection with the planter, to one side of the planter and they cannot track when thrown to one side by such driving. The lateral flexure of the check-rower attachment due to its universal connection with the planter at the center of the axle thereof overcomes all this, as it causes the marker-blades to move straight ahead when the team and planter swerve. In point of fact in planters of this class which I have constructed and operated I find that with very little play in the swivel connection between the check-rower frame and the axle the check-rower attachment has such flexibility that the vertical positions of the check-rower wheels at opposite sides of the planter may differ as much as two feet without in the least affecting the operation of the planter, the accuracy of the dropping, or the uniformity of the planting, and when the draft-animals swerve or move out of a straight course the planter turns upon the center or mid-length of its axle, and the check-rower attachment being pivoted on the same center it is not drawn to one side or swerved out of a right line, as the animals are soon brought into line and all goes ahead again. It will be also noted that the gear connection between the check-rower attachment and the planter being also at a point coincident with the universal joint between the check-rower attachment and the planter, such gear connection is unaffected by the swerving of the planter into an angular position with relation to the check-rower attachment, and it is also unaffected by the rising and falling and tilting and wobbling of the check-rower attachment as a whole. It is not absolutely essential that the universal joint between the check-rower attachment and the planter should be connected directly with the axle of the planter, for it may be slightly forward or to the rear of the axle or above or below the axle upon a separate shaft; but of course such vari-

ations must be within comparatively narrow limits and the universal joint must be approximately at the center of the planter, between the ground-wheels thereof. Indeed, I have found by practice that the simplest and best point for such joint is that shown in the drawings—to wit, at the center of the axle of the ground-wheels, which is the real center of the planter.

Obviously various changes in construction and modifications in the form and arrangement of the parts of my planter will readily suggest themselves to one skilled in the art to which my invention appertains; but all such changes, so long as the results sought are attained, are contemplated by my invention.

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

1. The combination with a corn-planter and the seed-dropping mechanism thereof, of an automatic check-rower attachment comprising a pair of spade marker-wheels operatively connected with the seed-dropping mechanism, said attachment being connected to the planter, approximately at the center thereof, between the ground-wheels, by a universal joint, substantially as and for the purpose described.

2. The combination with a corn-planter and the seed-dropping mechanism thereof, of an automatic check-rower attachment connected to the planter, approximately at the center thereof between the ground-wheels, by a universal joint and comprising a pair of spade marker-wheels operatively connected with the dropping mechanism approximately at a center coincident with said universal joint, substantially as and for the purpose described.

3. The combination with a corn-planter and the seed-dropping mechanism thereof, of an automatic check-rower attachment connected to the axle of the planter, by a universal joint, at the center thereof between the ground-wheels, and comprising a pair of spade marker-wheels operatively connected with the seed-dropping mechanism, substantially as and for the purpose described.

4. The combination with a corn-planter and the seed-dropping mechanism thereof, of an automatic check-rower attachment connected to the axle of the planter, by a universal joint, at the center thereof between the ground-wheels and comprising a pair of spade marker-wheels operatively connected with the dropping mechanism approximately at the center of the planter-axle, substantially as and for the purpose described.

5. The combination with a corn-planter and the seed-dropping mechanism thereof, of an automatic check-rower attachment comprising a frame connected by a universal joint with the planter approximately at the center thereof between the ground-wheels, a transverse shaft loosely journaled in said frame, spade marker-wheels on the ends of said shaft

and operatively connected with the dropping mechanism at or about the center of the planter, substantially as and for the purpose described.

6. The combination with a corn-planter and the seed-dropping mechanism thereof, of an automatic check-rower attachment comprising a frame connected by a universal joint with the axle of the planter at the center thereof between the ground-wheels, a transverse shaft loosely journaled in said frame, spade marker-wheels on the ends of said shaft and a gear connection between said shaft and the axle of the planter approximately coincident with the center of length thereof, substantially as and for the purpose described.

7. The combination with a corn-planter and the seed-dropping mechanism thereof, of an automatic check-rower attachment comprising a frame connected by a universal joint with the axle of the planter at the center thereof between the ground-wheels, a transverse shaft loosely journaled in said frame, spade marker-wheels on the ends of said shaft and a sprocket-wheel-and-chain connection between said shaft and the axle at the center of length thereof, the sprocket-wheel on the axle being loosely mounted thereon and operatively coacting with the dropping mechanism to intermittently actuate the same substantially as and for the purpose described.

8. The combination with a corn-planter and the seed-dropping mechanism thereof, of an automatic check-rower attachment connected to the planter approximately at the center thereof by a universal joint and comprising a pair of spade marker-wheels, one or more tappets loosely journaled approximately at the center of the planter and a gear connection between said marker-wheels and the tappets, whereby the latter are operated by the former, said tappets being operatively connected with the seed-dropping mechanism, substantially as and for the purpose described.

9. The combination with a corn-planter and the seed-dropping mechanism thereof, of an automatic check-rower attachment connected to the axle of the planter by a universal joint at the center thereof between the ground-wheels, and comprising a pair of spade marker-wheels, one or more tappets loosely mounted upon the axle about the center of length thereof and a gear connection between said marker-wheels and the tappets, whereby the latter are operated by the former, said tappets being operatively connected with the seed-dropping mechanism, substantially as and for the purpose described.

10. The combination with a corn-planter and the seed-dropping mechanism thereof, of an automatic check-rower attachment connected to the axle of the planter by a universal joint at the center thereof between the ground-wheels, and comprising a pair of spade marker-wheels, one or more tappets loosely mounted upon the axle about the center of

length thereof and a sprocket-wheel-and-chain connection between said marker-wheels and the axle at the center of length thereof, the sprocket-wheel on the axle being loosely
5 mounted thereon and operatively coacting with the dropping mechanism to intermittently actuate the same, substantially as and for the purpose described.

11. The combination with a corn-planter
10 and the seed-dropping mechanism thereof, of an automatic check-rower attachment connected to the planter at or about the center thereof, and comprising a pair of spade marker-wheels, one or more tappets loosely
15 journaled at or about the center of the planter, a gear connection between said marker-wheels and the tappets, whereby the latter are operated by the former, a crank-arm, a cam adapted and arranged to be struck by the tappets
20 to actuate said crank-arm and a rod connecting said crank-arm with the seed-dropping mechanism, substantially as and for the purpose described.

12. The combination with a corn-planter
25 and the seed-dropping mechanism thereof, of an automatic check-rower attachment connected to the planter at or about the center thereof, and comprising a pair of spade marker-wheels, one or more tappets loosely
30 journaled at or about the center of the planter, a gear connection between said marker-wheels and the tappets, whereby the latter are operated by the former, a crank-arm, a cam adapted to be struck by the tappets to actuate said crank-arm and an adjustable rod connecting said crank-arm with the
35 seed-dropping mechanism, substantially as and for the purpose described.

13. The combination with a corn-planter
40 and the seed-dropping mechanism thereof, of an automatic check-rower attachment connected to the planter at or about the center thereof, and comprising a pair of spade marker-wheels, one or more tappets loosely
45 journaled at or about the center of the planter, a gear connection between said marker-wheels and the tappets, whereby the latter are operated by the former, a crank-arm, a cam adapted to be struck by the tappets to actuate said crank-arm and an adjustable connection between said crank-arm and
50 the seed-dropping mechanism, substantially as and for the purpose described.

14. The combination with a corn-planter
55 and the seed-dropping mechanism thereof, of an automatic check-rower attachment connected to the axle of the planter by a universal joint at the center thereof between the ground-wheels, and comprising a pair of spade marker-wheels, one or more tappets loosely mounted upon the axle about the center of length thereof, a gear connection between the marker-wheels and the tappets, whereby the latter are operated by the former, a crank-arm, a cam adapted to be struck by the tappets to operate said arm and a connecting-rod between
65 said crank-arm and the seed-dropping mechanism, substantially as and for the purpose described.

anism, substantially as and for the purpose described.

15. The combination with a corn-planter
70 and the seed-dropping mechanism thereof, of an automatic check-rower attachment connected to the axle of the planter by a universal joint at the center thereof between the ground-wheels, and comprising a pair of spade marker-wheels, one or more tappets loosely mounted upon the axle about the center of length thereof, a sprocket-wheel mounted upon the hub supporting the tappets and a sprocket-chain-and-wheel connection from said tappet
75 sprocket-wheel to the shaft of the marker-wheels, said tappets being operatively connected with the seed-dropping mechanism, substantially as and for the purpose described.
85

16. The combination with a corn-planter
and the seed-dropping mechanism thereof, of an automatic check-rower attachment comprising a pair of spade marker-wheels operatively connected with said dropping mechanism, said attachment being connected to the planter approximately at the center thereof between the ground-wheels by a universal joint, said marker-wheels being each positioned a distance outside of the ground-wheels
90 corresponding with one-half the distance between said ground-wheels, substantially as and for the purpose described.
95

17. The combination with a corn-planter
and the seed-dropping mechanism thereof, of
100 an automatic check-rower attachment connected to the planter approximately at the center thereof between the ground-wheels, by a universal joint and comprising a pair of spade marker-wheels operatively connected
105 with the dropping mechanism, of a pair of lifting-arms pivoted to the planter-frame and adapted to engage a cross-bar of the check-rower attachment, stops on said arms and means for raising and lowering the same, substantially as and for the purpose described.
110

18. The combination with a corn-planter
and the seed-dropping mechanism thereof, of an automatic check-rower attachment connected to the planter at or about the center
115 thereof between the ground-wheels, by a universal joint, and comprising a pair of spade marker-wheels operatively connected with said dropping mechanism at or about a center coincident with said universal joint, a pair
120 of lifting-arms pivoted to the frame of the planter and adapted to engage a cross-bar on the check-rower-attachment frame, stops on said arms and means for raising and lowering the same, substantially as and for the purpose described.
125

19. The combination with a corn-planter
and the seed-dropping mechanism thereof, of an automatic check-rower attachment connected to the planter at or about the center
130 thereof between the ground-wheels, by a universal joint, and comprising a pair of spade marker-wheels operatively connected with said dropping mechanism at or about a center

ter coincident with said universal joint, a pair of lifting-arms pivoted to the frame of the planter and adapted to engage a cross-bar on the check-rower-attachment frame, stops on said arms and a lock-lever secured to one of said arms for simultaneously raising and lowering both of said arms through their pivot connections, substantially as and for the purpose described.

20. The combination with a corn-planter and the seed-dropping mechanism thereof, of an automatic check-rower attachment connected to the planter at or about the center thereof between the ground-wheels, by a universal joint, and comprising a T-shaped frame, the body portion of which is connected at its ends to the planter, and the cross-bar of which carries a transverse shaft, spade marker-wheels mounted on said shaft, tappets loosely journaled at the center of the planter and operatively connected with the seed-dropping mechanism, a sprocket-wheel-and-chain connection between said shaft and a hub of the tappets at the center of length thereof, lifting-arms pivoted to the frame of the planter and adapted to engage the cross-bar of the check-rower attachment, stops on said arms and means for raising and lowering the same, substantially as and for the purpose described.

21. The combination with a corn-planter and the seed-dropping mechanism thereof, of an automatic check-rower attachment comprising a T-shaped frame, the cross-bar of which carries a transverse shaft upon the ends of which are mounted a pair of spade marker-wheels, a collar loosely mounted upon the axle of the planter at the center thereof and provided with radial lugs to receive the perforated bifurcated end of the body portion of the frame, said shaft being operatively connected with the seed-dropping mechanism, substantially as and for the purpose described.

22. The combination with a corn-planter and the seed-dropping mechanism thereof, of an automatic check-rower attachment comprising a T-shaped frame, the cross-bar of which carries a transverse shaft upon the ends of which are mounted a pair of spade marker-wheels, a collar loosely mounted upon the axle of the planter at the center thereof and provided with radial lugs to receive the perforated bifurcated end of the body portion of the frame, a hub loosely mounted upon the axle adjacent to said collar and having an oblique web or spokes carrying a sprocket-wheel in a vertical plane coincident with the lugs on said collar, a sprocket-wheel on said shaft and a chain trained around said sprocket-wheel and the sprocket-wheel on the axle, tappets radiating from said hub and means operated by said tappets for actuating the seed-dropping mechanism, substantially as and for the purpose described.

23. The combination with a corn-planter and the seed-dropping mechanism thereof, of

an automatic check-rower attachment connected to the planter at or about the center thereof between the ground-wheels, by a universal joint, and comprising a pair of spade marker-wheels mounted upon a transverse shaft, tappets loosely journaled at the center of the planter and operatively connected with the seed-dropping mechanism, a sprocket-wheel-and-chain connection between said tappets and the shaft of the check-rower attachment, the sprocket-wheel on said shaft being circumferentially adjustable, substantially as and for the purpose described.

24. The combination with a corn-planter and the seed-dropping mechanism thereof, of an automatic check-rower attachment connected to the planter at or about the center thereof between the ground-wheels, by a universal joint, and comprising a pair of spade marker-wheels mounted upon a transverse shaft, tappets loosely journaled at the center of the planter and operatively connected with the seed-dropping mechanism, a sprocket-wheel-and-chain connection between said tappets and the shaft of the check-rower attachment, the sprocket-wheel on said shaft being loosely mounted thereon and having a lateral projection, a collar fast on said shaft, ears on said collar at opposite sides of the projection on the sprocket-wheel and screw-bolts working through said ears and impinging against said projection, substantially as and for the purpose described.

25. In a corn-planter, the combination with the main axle and planter mechanism, of a bifurcated arm pivotally secured to said axle, a shaft supported by said arm and provided with marker-wheels, a hub having a sprocket and tappet integral therewith, a rock-shaft controlling the feed-valves, gearing intermediate said hub and marker-shaft whereby the hub is revolved, and mechanism intermediate the tappets and rocker-shaft whereby said shaft is rocked and the feed-valves opened, substantially as shown and for the purpose described.

26. In a corn-planter, the combination with the main axle and planter mechanism, of a shaft pivotally connected to said main shaft and provided with marker-wheels, a hub having a sprocket and tappets integral therewith, rocker-shaft controlling the feed-valves, gearing intermediate said hub and marker-wheels whereby the hub is revolved a crank-arm on said rocker-shaft, said arm arranged to be oscillated by the revolving tappets, whereby the rocker-shaft is rocked and the feed-valves opened at predetermined intervals, substantially as shown and for the purpose described.

27. In a corn-planter, the combination with the axle and planter mechanism, of a trailing marker-shaft pivotally connected to said axle, whereby the marker-shaft is laterally adjustable, said shaft provided with marker-wheels having spades, each alternate spade corresponding in width, but varying from the width of the intermediate spade, and mechanism in-

intermediate said marker-shaft and the rocker-shaft, of the seed-dropping mechanism whereby the rocker-shaft is rocked when each alternate spade engages with the soil, substantially as shown and for the purpose described. 5

28. In a corn-planter, the combination with the axle and planter mechanism, of a marker-shaft pivotally connected to said axle and provided with marker-wheels having spades of 10 varying widths, a hub having a sprocket and tappets integral therewith, said hub geared to said marker-shaft, mechanism interme-

diate said tappets and the rocker-shaft, of the seed-dropping mechanism, whereby the rocker-shaft is rocked at the engaging of 15 each alternate marker-spade with the soil, and lifting-arms adapted to engage the frame carrying the marker-shaft and pivoted upon a shaft controlled by a lifting-lever, substantially as shown and for the purpose described. 20

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Witnesses:

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