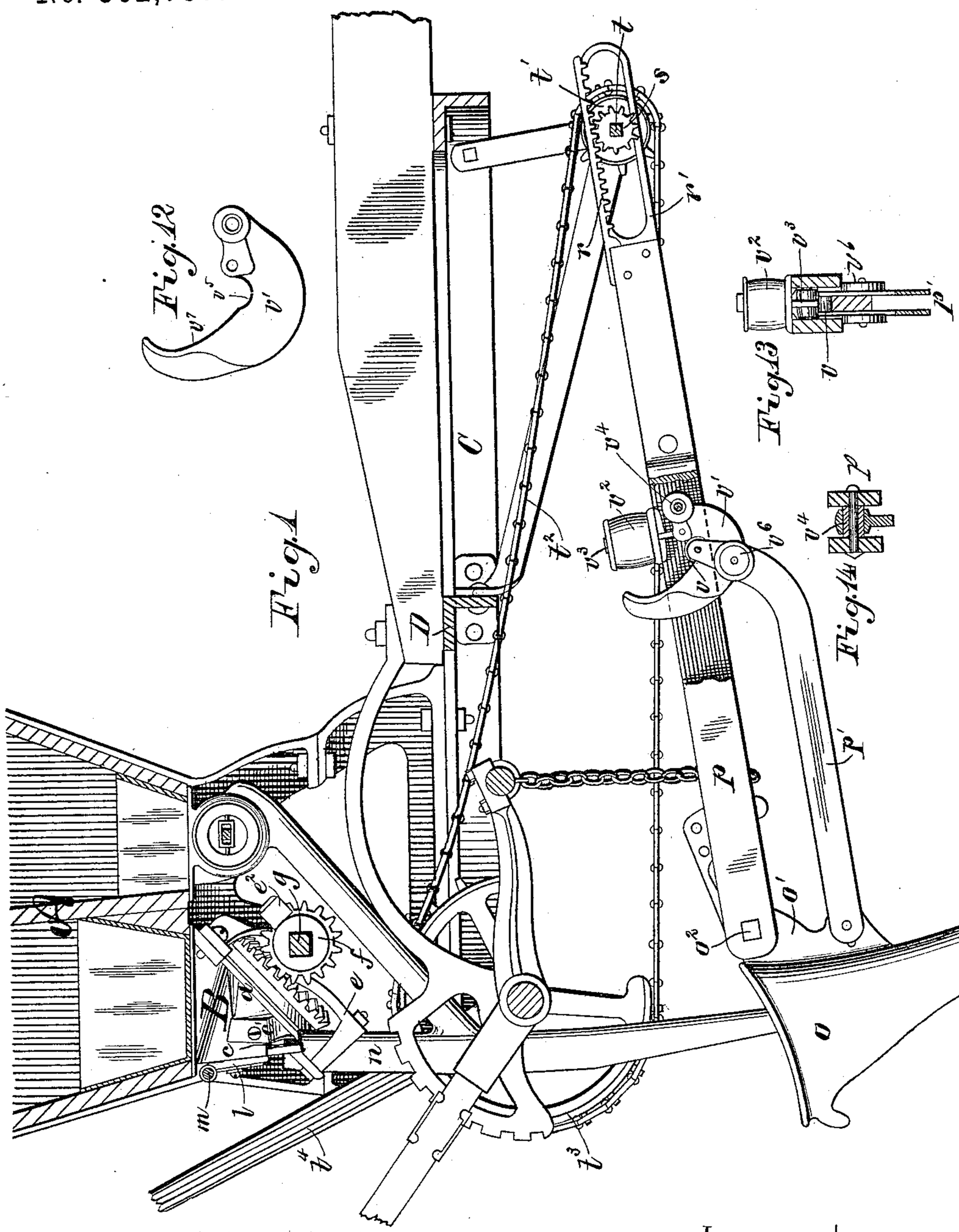
(Model.)

4 Sheets—Sheet 1.

A. J. MARTIN.

GRAIN DRILL.

No. 362,757. Patented May 10, 1887.



Attest

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P. J. Sevenger

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Andrew J. Martin

By his Attorney

Paul A. Staley

(Model.) 4 Sheets—Sheet 2.

A. J. MARTIN.

GRAIN DRILL.

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Fig. 2

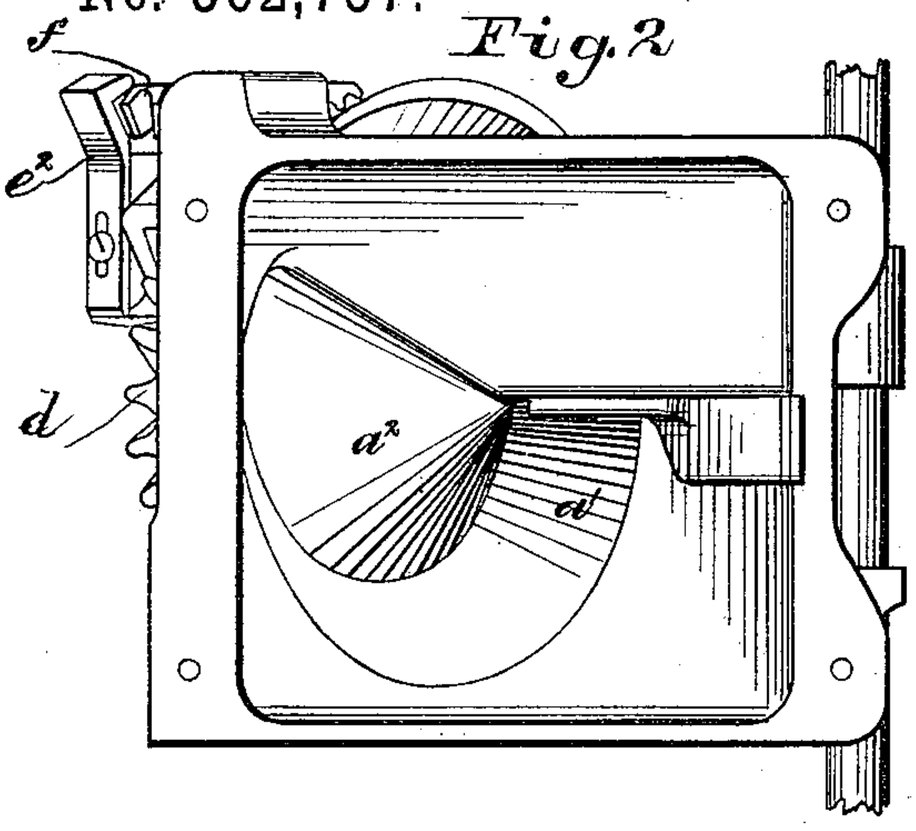


Fig. 5

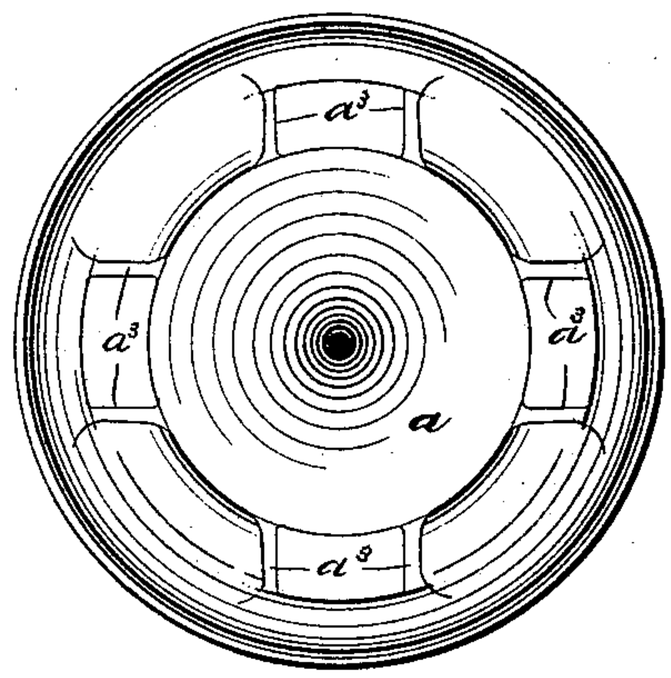


Fig. 3

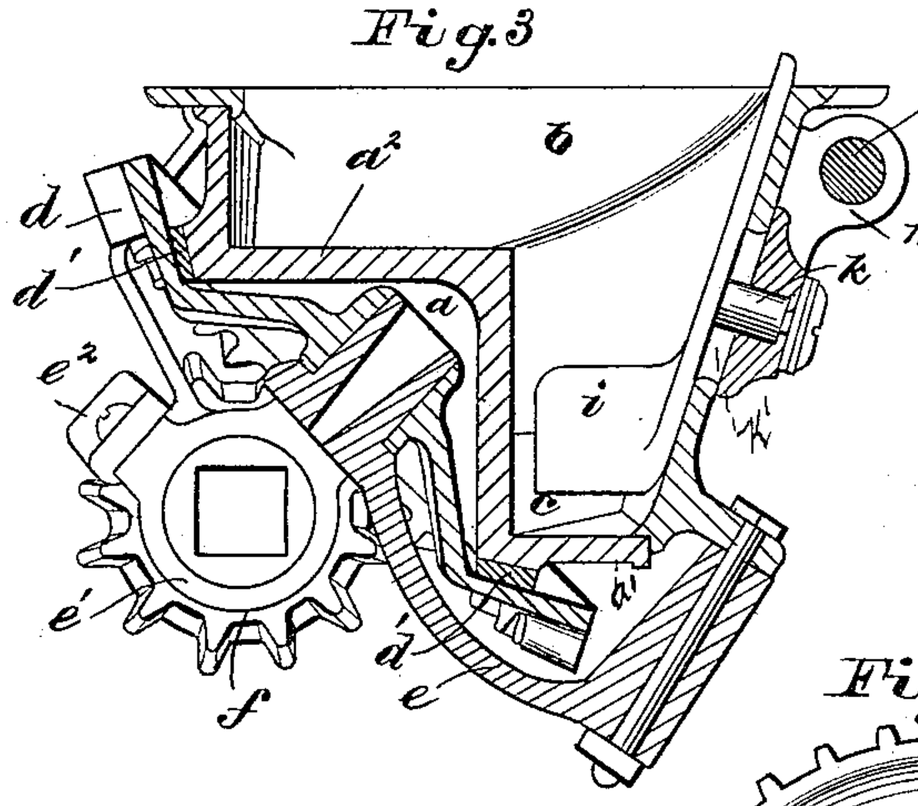


Fig. 4

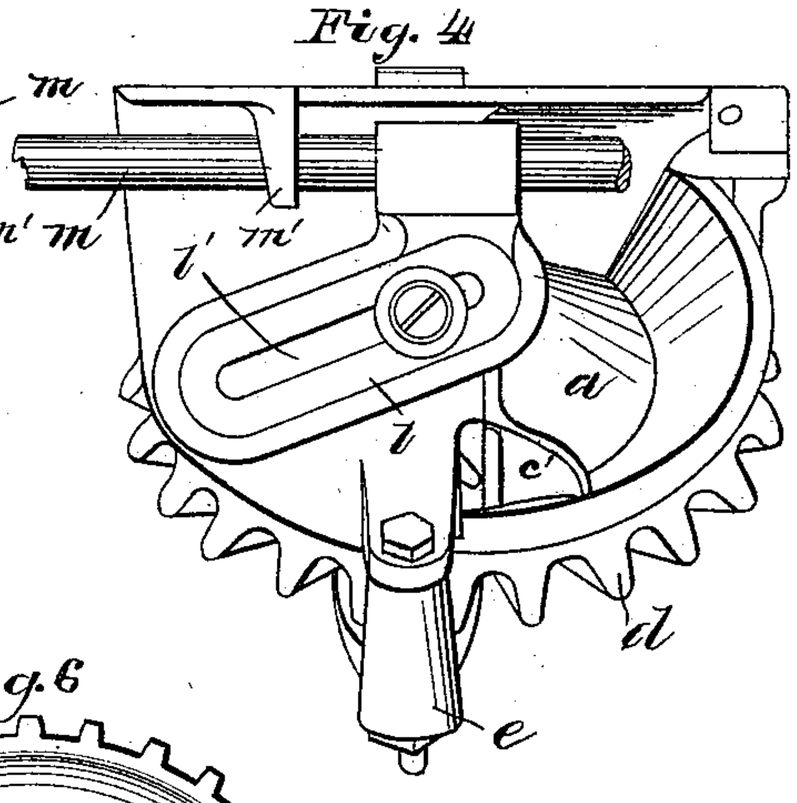
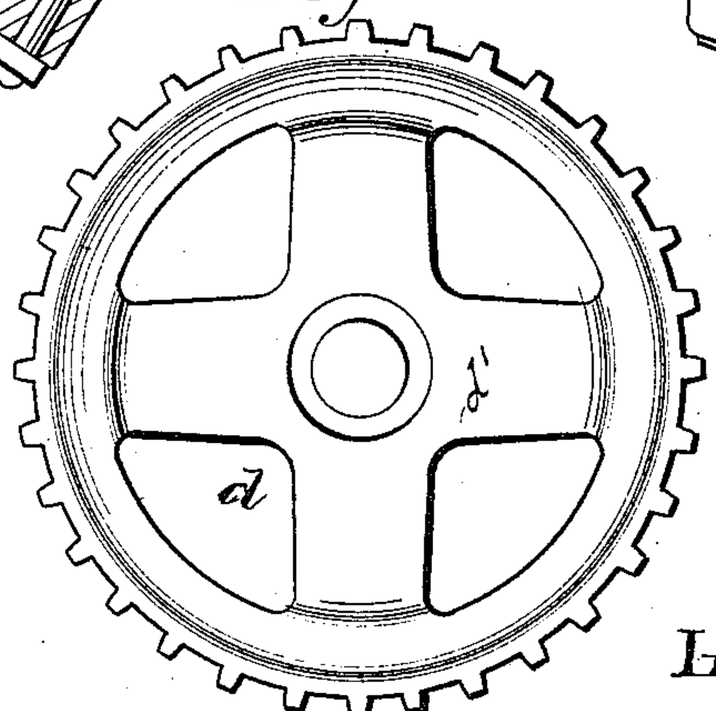


Fig. 6



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(Model.) 4 Sheets—Sheet 3.

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Fig. 7

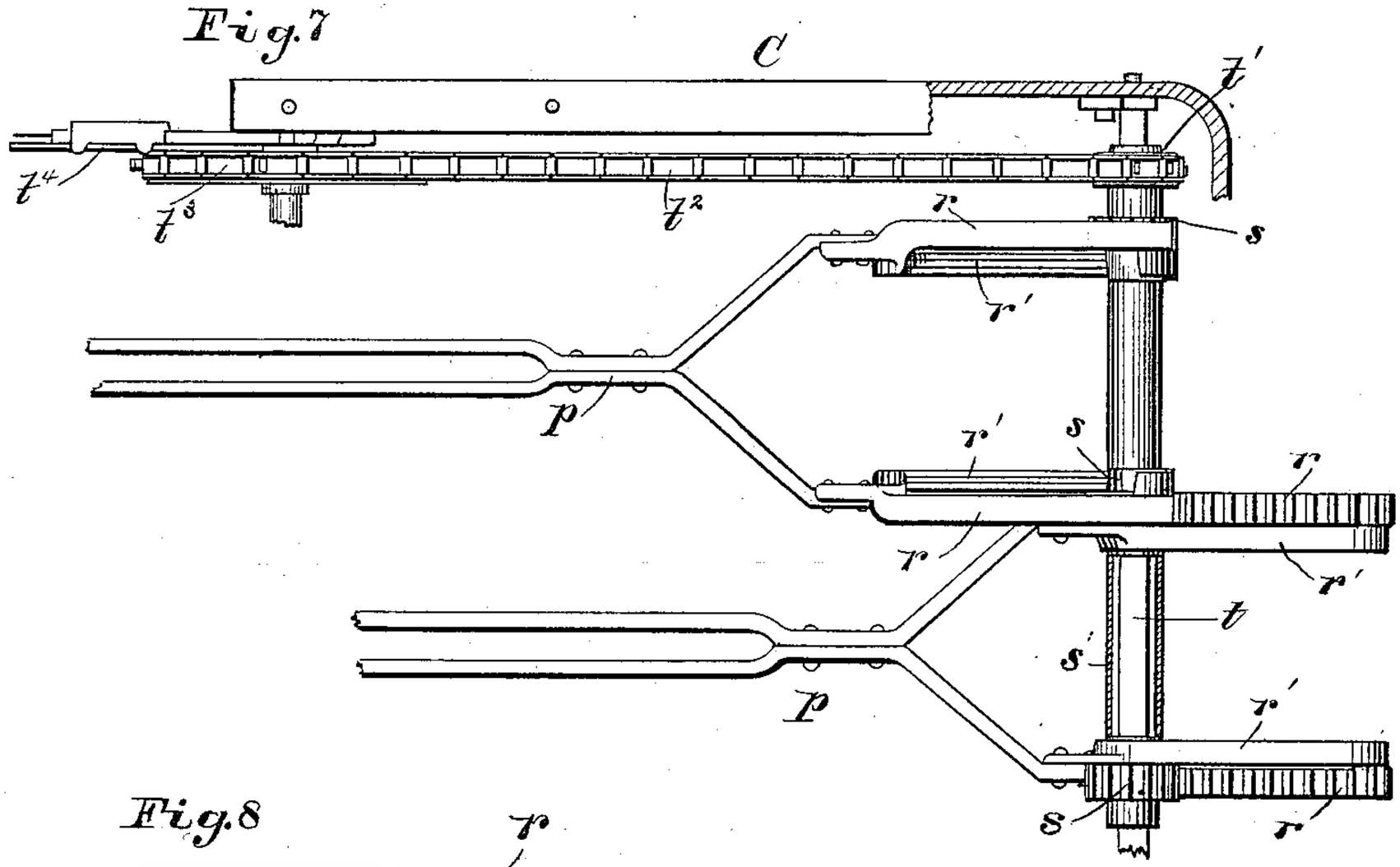


Fig. 8

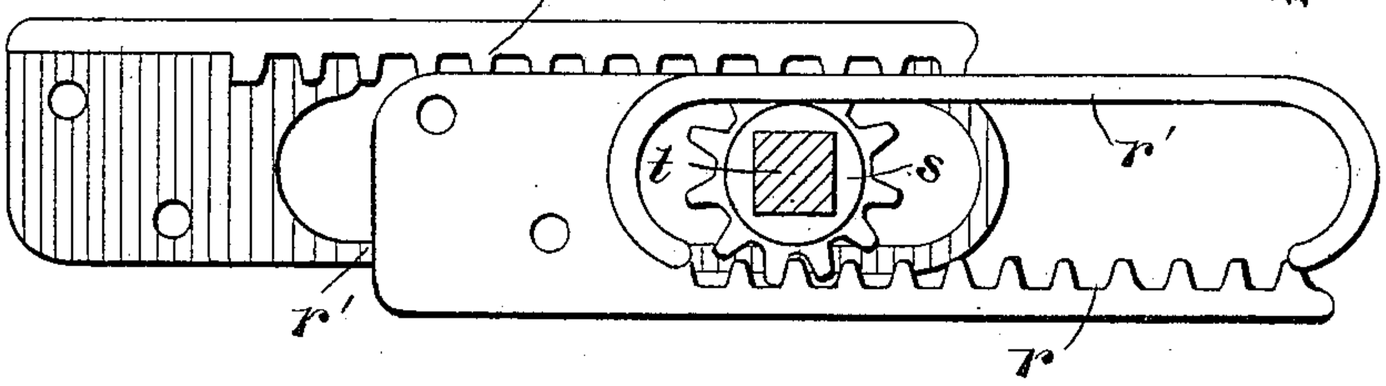
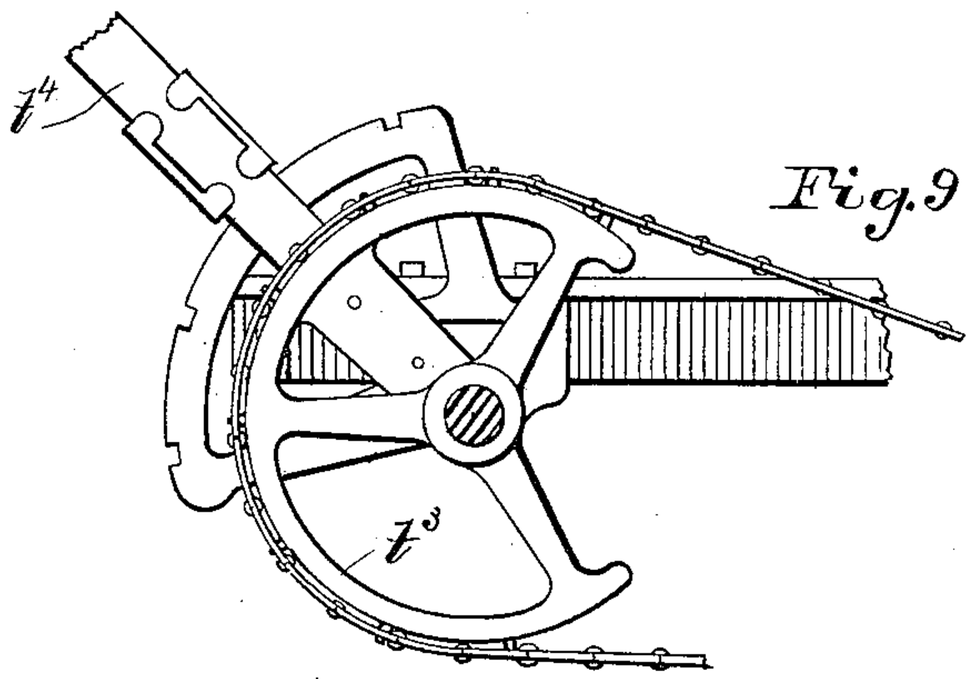
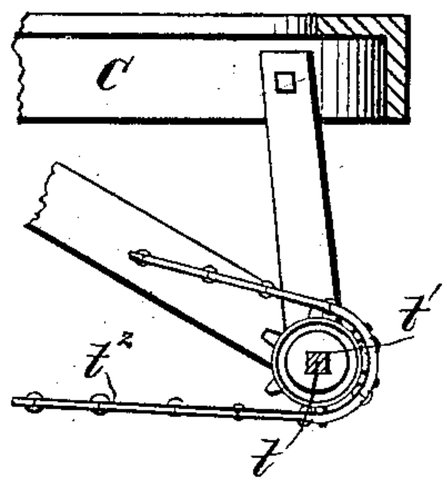


Fig. 9





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(Model.)

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GRAIN DRILL.

No. 362,757. Patented May 10, 1887.

Fig. 10

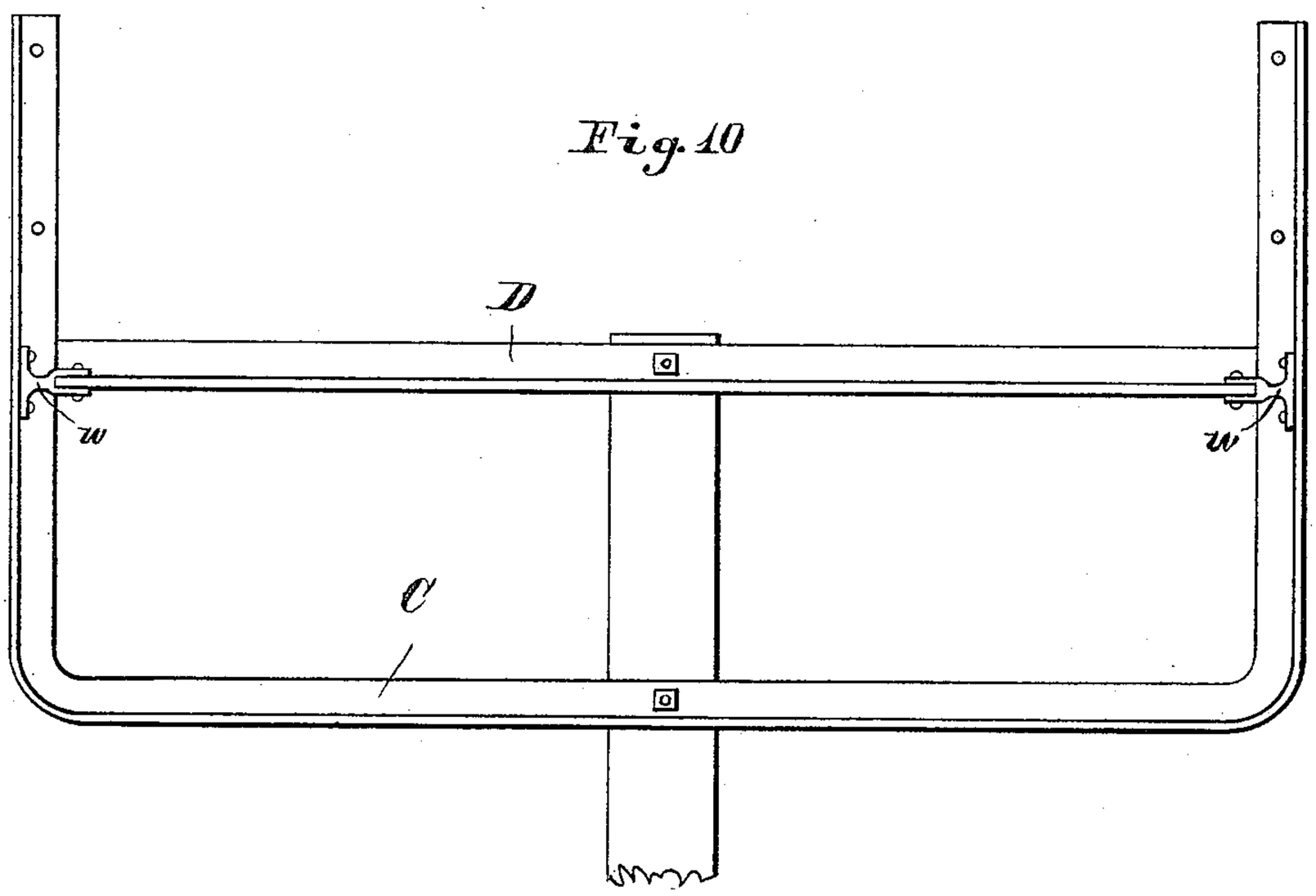
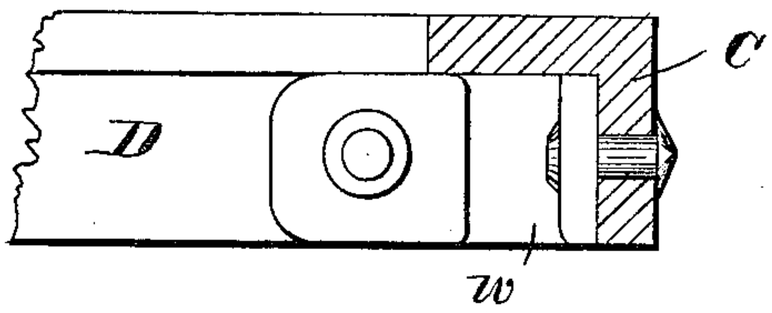


Fig. 11



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UNITED STATES PATENT OFFICE.

ANDREW J. MARTIN, OF MECHANICSBURG, OHIO.

GRAIN-DRILL.

SPECIFICATION forming part of Letters Patent No. 362,757, dated May 10, 1887.

Application filed October 31, 1884. Serial No. 146,963. (Model.)

To all whom it may concern:

Be it known that I, ANDREW J. MARTIN, a citizen of the United States, residing at Mechanicsburg, in the county of Champaign and State of Ohio, have invented certain new and useful Improvements in Grain-Drills, of which the following is a specification.

My invention relates to improvements in grain drills; and it consists, first, in a novelly-constructed feeding mechanism particularly adapted to feeding or distributing fertilizing materials, and also adapted to feeding wheat or other cereals; second, in a novel arrangement of racks and pinions in connection with the drag-bars for adjusting the hoes in double or single rank, commonly known as the "zig-zag;" third, in a peculiarly-constructed spring-hoe device; fourth, in a wrought-iron frame made of angle-iron of peculiar shape and having the sides and front formed of a single piece, as hereinafter more fully set forth.

In the accompanying drawings, which form a part of this specification, Figure 1 is a vertical transverse sectional view of a grain-drill embodying my invention. Figs. 2 to 6, inclusive, are views of the fertilizer-distributer or feeding mechanism. Figs. 7, 8, and 9 are views of the zigzag mechanism. Figs. 10 and 11 are detailed views of the frame, and Figs. 12, 13, and 14 are detailed views of the spring-hoe.

Like parts are indicated by similar letters of reference throughout the several views.

In the said drawings, A represents the hopper, divided into two compartments, for the seed and fertilizer, respectively.

B represents the improved feeding mechanism or fertilizer-distributer, and C the main frame, to which the hopper is bolted at either end and to which the working parts of the drill are attached.

The feeding mechanism B (shown in detail in Figs. 2 to 6, inclusive) is constructed as follows: The feeding-wheel *a*, which is preferably made of glass, is provided with a flange or rim, *a'*, which stands at an angle to the plane of the wheel. The center of the wheel is provided with a conical elevation, a^2, the base of which joins the inner edge of the flange *a'*, the sides of said elevation being preferably constructed parallel with flange *a'* on opposite sides of the wheel. The wheel *a* is adapted to run in a cup, *b*, and is placed at such an angle therein that the top line of the conical elevation and the bottom line of the flange stand horizontally across the cup, as shown in section in Fig. 3. The cup *b* is provided on one side with a vertical wall, which extends from the point of the conical elevation a^2 downward, the said wall being cut away at the bottom to form an opening, *c*, through which the fertilizer is discharged. The vertical wall of the cup about the opening *c* is adapted to fit closely up against the side of the cone a^2, to prevent the fertilizer from being carried through. From the point of the cone a^2 the bottom of the cup is made to fit closely to the upper surface of the cone at a point somewhat below the top line of the said cone. The outer edge of the flange of that portion of the wheel which runs on the inside of the cup is adapted to fit snugly around the bottom of the said cup, which is turned out to form a bearing therefor. The side walls of the cup are sloped from the top down to the wheel *a*, so that the fertilizer therein will slide down onto said wheel and be carried with it through the discharge-opening *c*. The feed-wheel receives its motion from a beveled gear-wheel, *d*, which turns on a suitable bearing on a supporting-frame, *e*, said supporting-frame being secured by bolts or other suitable means to the bottom of cup *b*. The supporting-frame *e* is also provided with a bearing for a beveled pinion, *f*, adapted to mesh with the gear *d*, the hub of said pinion being turned off to fit said bearing *e'*. This pinion is held against longitudinal movement in the bearing *e'* by means of a small clip, e^2, which is secured to the outer surface of the bearing *e'*, and is provided with a projecting lip, which extends down over the ends of the teeth in the pinion *f*. The pinion *f* is provided through its center with a square hole adapted to fit snugly over a square shaft, *g*, which is journaled at each end in suitable bearings to the hopper A, and which is revolved through suitable intermediate mechanism from the driving or carrying wheels in the ordinary manner.

The feed-wheel *a*, as before stated, is preferably made of glass. It is provided on the back with a series of lugs, a^3, adapted to extend on either side of the respective arms *d'* of the gear-wheel *d*. To prevent the feed-wheels

from being broken by any inequality in the gear *d* and to secure a yielding pressure of the wheel *a* against the cup *b*, I place between the said feed-wheel and each of the arms *d'* a piece of rubber or other elastic material. (See Fig. 3.)

In order to regulate the quantity of feed or fertilizer sown by the wheel *a*, I provide on the inside of the cup, over the opening *c*, an adjustable slide, *i*, adapted to slide vertically over said opening *c*, and thereby partially or entirely close said opening, as desired. The slide *i* is provided on one side with a stud, *k*, which projects through a slotted opening, *k'*, in the side of the cup and engages in a cam-groove, *l'*, in a cam-piece, *l*. This cam-piece *l* is attached to a sliding rod, *m*, which extends the entire length of the hopper A, said rod being preferably provided with a bearing, *m'*, on each of the feed-cups and adapted by a suitable hand-lever to be moved longitudinally, as desired. It will be seen that upon moving the sliding rod *m* longitudinally in either direction the opening *c* will be correspondingly opened or closed. In order to direct the material discharged through the opening *c* into the tube by which it is conveyed to the hoe, I provide immediately in front of the opening *c* a guide or scraper, *c'*, adapted to bear against the flange *a'* of the feeding-wheel and to turn the material over the edge of said flange into the tube *n*. The shaft *g* being revolved, the feed-wheel *a* is rotated through the cup *b* toward the opening *c*. The material in the hopper falls onto the wheel *a* and is carried thereby through the opening *c*, and discharges into the tubes *n*, and thence through the hoe *o* to the ground.

It is obvious that any desired number of the distributers may be used in the length of the hopper A.

The feed-shaft *g* and sliding rod *m* being extended through each of the cups *b*, the fertilizer-distributers are all adapted to be operated and controlled simultaneously.

The seed and fertilizer as fed from the respective compartments of the hopper A fall through the tubes *n* to the hoes *o*, and thence to the ground. As many hoes are provided as there are distributers. Each of these hoes is secured to the rear end of a drag-bar, *p*. These drag-bars are each preferably composed of two flat bars of iron formed and riveted together as shown in Fig. 7. Each drag-bar is provided at the forward end with two racks, *r r*, of peculiar construction, adapted to engage with pinions *s* on a square shaft, *t*. The said shaft *t* is journaled at each end in a suitable bearing attached to the main frame C. The pinions *s* are slipped upon the shaft *t*, and are held against longitudinal movement thereon by collars or sleeves *s'*. Each pinion *s* is provided on either side with a hub of considerable length. The racks of each alternate drag-bar are adapted to engage with the pinions *s* on the top, and the racks of the other drag-bars are adapted to engage with said pinions at the bottom. Each pinion, therefore, has engaged therewith two racks on diametrically-opposite sides thereof. It will thus be seen that if the pinions are revolved in either direction one half of the racks, and consequently the drag-bars and hoes thereto attached, will be moved longitudinally forward, and the other half will be moved longitudinally backward. Means are thus provided whereby the hoes may be adjusted in double or single rank, as desired.

To prevent the racks *r r* from becoming disengaged from the pinions *s* by a vertical or lateral movement thereon, each rack is provided with a guide piece or way, *r'*, which is adapted to reciprocate on the hub of the pinion with which said rack engages. Each of the said guides is located on that hub of the pinion which is nearest the drag-bar to which said rack is attached, and is adapted to bear on said hub on the side diametrically opposite said rack. The guides *r'* are each preferably extended at either end, so as to join the respective ends of the racks, and thus limit the stroke of the racks in either direction. The teeth of the pinions extend above the guides *r'*, and thus prevent a lateral movement of the said guides on the pinion-hubs. It will be seen that by this construction the racks are held against both vertical and lateral movement, but are free to move longitudinally to a limited extent in either direction.

In arranging the drag-bars on the shaft *t* a pinion is first slipped thereon and a sleeve *s'* placed next to said pinion. A drag-bar is then placed on said shaft with the teeth of one of its racks engaging with the teeth of the said pinion. A second pinion is then slipped on the shaft and its teeth engaged with the teeth of the other rack. Another sleeve is added and another drag-bar, the teeth in the racks of the second drag-bar being engaged with the pinions on the opposite side from the racks of the first drag-bar. Another pinion, sleeve, and drag-bar are then added, and so on until all are in place, the first and last pinions being held against longitudinal movement on the shaft by any suitable and well-known means.

To provide for rotating the shaft *t* in either direction, I secure on one end of said shaft a small chain-wheel, t', adapted to be revolved by a chain, t^2, which passes at one end around said chain-wheel and at the other end around a chain-wheel, t^3, of larger diameter. On one side of the chain-wheel t^3 is secured a hand-lever, t^4, by means of which the chain-wheel t^3 may be revolved, and, by chain t^2, thereby revolve the shaft *t*.

It will be seen from the above description that by a movement of the hand-lever t^4 the hoes *o* may be arranged in double or single rank, as desired.

To provide for a yielding movement of the hoes *o*, and thus avoid breakage in meeting an obstruction, I attach each of the hoes to its drag-bar by means of a novel spring device, as follows: The neck *o'* of each hoe is placed

between the flat bars which compose the drag-bar to which said hoe is attached. A bolt, o^2, which passes through the end of the drag-bar and through the neck o', serves to attach the hoe to the drag-bar in such a manner that the said hoe is free to oscillate on said bolt. Attached to the hoe o, at a point some inches below the bolt o^2, is a connecting-bar, p'. This connecting-bar is preferably composed of two flat strips of metal and is bent up at its forward end and adapted to project up between the flat bars which compose the drag-bar p. The forward end of the connecting-bar p' is provided with a small roller, v, which rests against a cam, v', said cam being pivoted between the bars which compose the drag-bar p. On the top of the drag-bar, just above the cam v', is a rubber cushion or spring, v^2. This spring v^2 is provided at the top and bottom with metallic washers, and is attached to the cam v' by a bolt, v^3, the head of which rests against the top washer of the spring v^2, said bolt being extended down through said spring and connected at the lower end to the cam v'.

The cam v' turns on a sleeve, v^4, which is riveted or bolted tightly between the sides of the drag-bar p. (See Fig. 14.) The spring v^2 is so attached to the cam v' that it tends to hold said cam at all times in the position shown in Fig. 1. When the cam is in this position, the small roller v in the end of the connecting-bar p' rests in a notch, v^5, in said cam. (See Fig. 12 for detail.) On either side of the connecting-bar p', a short distance below the roller v, are rollers v^6, adapted to bear against the lower edges of the bars which compose the drag-bar p.

When the cam v' is in the position shown in Fig. 1, the center on which the cam turns, the center of the roller v, and the center of the pin which attaches the connecting-bar p' to the hoe are all on a direct line, and the pulling strain of the hoe is brought directly on the sleeve v^4. In case, however, the hoe meets with a sudden shock, as by striking an obstruction—such as a large stone or root—the roller v will be forced out of the notch v^5 and roll along the face v^7 of said cam. The rollers v^6 roll along the lower edge of the drag-bar p. The cam v' is thus turned on its axis and compresses the spring v^2. The hoe, being relieved from the draft of the connecting-bar, turns back on the bolt o^2 and passes over the obstruction. As soon as the obstruction is passed the elasticity of the spring v^2 returns the cam v' to its normal position, and the hoe again assumes a working position.

The main frame C, to which the various working parts are attached, I make of angle-iron, and preferably of that kind known as "square-root" iron, in which the sides or wings form with each other an angle of ninety degrees and are of an equal thickness throughout. In forming a frame from this iron it is cut of a proper length and the holes for securing the hopper, tongue, and other parts thereto punched in the bar. It is then properly heated and placed in a suitable former and bent around at the corners, thus forming the ends and front in a single piece.

In bending the frame means are preferably provided by which the length of the end pieces are gaged from the holes which are adapted to receive the bolts that secure the hopper thereto. Any shrinkage or stretching of the iron in bending the corners may thus be avoided.

To prevent the end pieces of the frame from being bent out of line at the rear end, and to add stability to the frame, I provide a cross-bar, D, of angle-iron, which is secured at each end by clips w, made preferably of malleable iron, said malleable clips being bifurcated at one end and adapted to extend over the lower projecting flange or wing of the cross-piece D. The base of each clip is adapted to bear against the inner side of the lower wing of one of the end pieces and is riveted thereto. The cross-piece D is cut to a length just equal to the distance between the inner edges of the horizontal wings of the end pieces, and when the clips are riveted fast in their places the ends of the frame are brought up to the proper distances apart.

Having thus described my invention, I claim—

1. The combination, with a feed-cup, of a feeding-wheel provided with an angular flange, said wheel being arranged in the cup, as described, so that the angular flange at the bottom of the wheel assumes a horizontal position, and means for revolving said wheel in said cup, substantially as and for the purpose set forth.

2. The combination, with a feed-cup, of a feeding-wheel provided with an angular flange and a central conical elevation having its sides parallel to the sides of the angular flange on opposite sides of the wheel, said wheel being placed at an angle in the cup, as described, so that the top of the conical elevation and the bottom of the flange will assume a horizontal position across the cup, and means for revolving said wheel through the cup, substantially as and for the purpose set forth.

3. The combination, with the feed-cup, of an oblique feed-wheel provided with an angular flange, said wheel being adapted to turn through said cup, an opening in said cup over the bottom of said flange, and means for opening and closing said opening, substantially as specified.

4. The combination, with a feed-cup, of a glass feeding-wheel provided with an angular flange and placed obliquely in said cup, said feeding-wheel being provided with lugs adapted to engage the arms of a bevel gear-wheel supported under said cup and to be revolved by said wheel, and an elastic cushion placed between said feed-wheel and gear, substantially as set forth.

5. The combination, with a feed-cup, of an oblique feeding-wheel provided with an angular flange and a vertical conical elevation, an opening in said cup over the bottom of said

flange, an adjustable slide for opening or closing said opening, a cam for raising or lowering said slide, and a rod for operating said cam, substantially as specified.

6. The combination, with a feed-cup, of an oblique feeding-wheel adapted to turn therein, said wheel being provided with an angular flange adapted to carry the material to be distributed through an opening in said cup, a gear and pinion supported on a frame secured to the bottom of said cup and adapted to revolve said feeding-wheel, and means for regulating the quantity of material carried through said opening, substantially as set forth.

7. The combination, with the feed-cup, of a feeding-wheel provided with an angular flange and adapted to turn obliquely in said cup, a variable opening over said flange in the bottom of said cup, and a guide or scraper immediately opposite said opening, substantially as and for the purpose set forth.

8. The combination, in a grain-drill, with a series of drag-bars to which the hoes are attached, of a shaft journaled in suitable bearings and provided with a series of pinions thereon, a series of racks on the ends of said drag-bars, the racks of each alternate drag-bar being adapted to engage on opposite sides of said pinions, and means for revolving said shaft in either direction, substantially as set forth.

9. The combination, with a series of drag-bars having hoes attached thereto, of a shaft journaled in suitable bearings and provided with a series of pinions thereon, a series of racks on the ends of said drag-bars, the racks of each alternate drag-bar being adapted to engage on opposite sides of said pinions, a guide or way on each rack adapted to hold said racks against vertical or lateral movement on the said pinions, and means for revolving said shaft, substantially as specified.

10. The combination, with a series of drag-bars having hoes attached thereto, of racks attached to said drag-bars, a revolving shaft provided with a series of pinions, with which said racks engage, the racks of each alternate drag-bar being adapted to engage on opposite sides of said pinions, a pivoted hand-lever adapted to oscillate in either direction and be held in different positions of adjustment, and means for connecting said shaft to said hand-lever, whereby the said shaft may be revolved by said hand-lever, substantially as set forth.

11. The combination, with a revolving shaft having a series of pinions held against lateral movement thereon, of a series of racks adapted to engage on opposite sides of said pinions, said racks being provided with guides or ways by which they are held against vertical or lateral movement on said pinions, whereby a revolution of the shaft in either direction produces a forward longitudinal movement of a portion of the racks and a backward longitudinal movement of the other racks, substantially as and for the purpose set forth.

12. The combination, with a square shaft adapted to turn in suitable bearings, of a series of pinions adapted to slip onto said shaft, sleeves on said shaft between said pinions for holding said pinions against lateral movement thereon, and racks adapted to engage on opposite sides of said pinions, said racks being provided with guides or ways adapted to hold them against lateral movement on said pinions, substantially as and for the purpose set forth.

13. The combination, with a drag-bar and a hoe pivoted thereto, of a cam journaled in said drag-bar, a spring attached to said cam and adapted to be compressed by a movement thereof, a connecting-bar pivoted at one end to the hoe some inches below the drag-bar and provided at the other end with a roller adapted to normally rest in a notch in said cam, and rollers on either side of the connecting-bar adapted to roll along the lower edges of the drag-bar, whereby the hoe is adapted by a sudden shock thereon to turn back in the drag-bar, and thereby compress the spring, the elasticity of which returns the hoe to its normal position when the pressure thereon is removed, substantially as specified.

14. The combination, with a drag-bar having a hoe pivoted thereto, of a cam journaled to said drag-bar and connected to a spring which is adapted to be compressed by a movement of said cam, and a connecting-bar pivoted at one end to the hoe some inches below the drag-bar, the other end of said connecting-bar being provided with a roller which normally rests in a position, as described, against the face of said cam, so that the center of said roller, the center of the cam, and point of connection between the connecting-bar and hoe are in a direct line, said roller being adapted to traverse the face of the cam, and thereby compress the said spring in case of a sudden shock or jerk against said hoe, substantially as and for the purpose set forth.

15. The combination, in a seeding-machine, with the seed-hopper, of the rectangular iron frame composed of angle-iron, the wings or flanges of which are formed of an equal thickness throughout and at right angles to each other, the front and end pieces of the said frame being formed from a single piece by bending the corners, a connecting-bar of the same material adapted to fit between the inner edges of the horizontal wings on the end pieces, and a bifurcated metallic clip at each end of said connecting-bar, adapted to embrace the vertical wing of said bar at one end and provided at the other with a base-piece adapted to bear against the vertical wing of the said end pieces, and means for securely connecting the said clip to the respective vertical flanges of the bar and end pieces, substantially as set forth.

In testimony whereof I have hereunto set my hand this 27th day of October, A. D. 1884.

ANDREW J. MARTIN.

Witnesses:

T. E. SHEPHERD,

T. J. GLENDENING.