No. 789,254. PATENTED MAY 9, 1905.

H. S. CAMPBELL.

FERTILIZER DISTRIBUTER.

APPLICATION FILED JUNE 14, 1904.

4 SHEETS—SHEET 1.

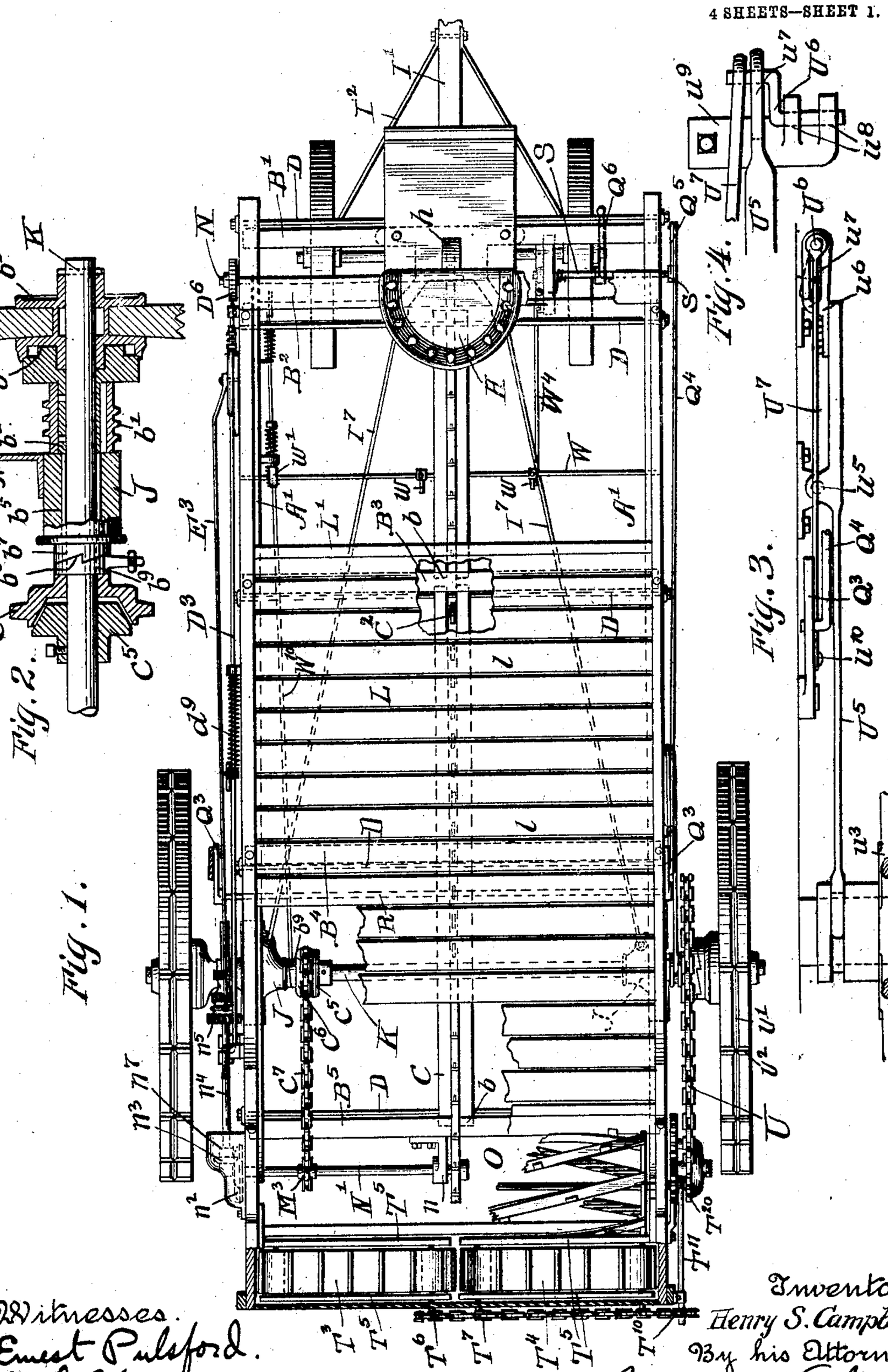

Fig. 1.

Fig. 2.

Fig. 4.

Fig. 3.

Witnesses.
Ernest Pulsford.
M. L. Adams.

Inventor
Henry S. Campbell
By his Attorneys
Baldwin & Wright.

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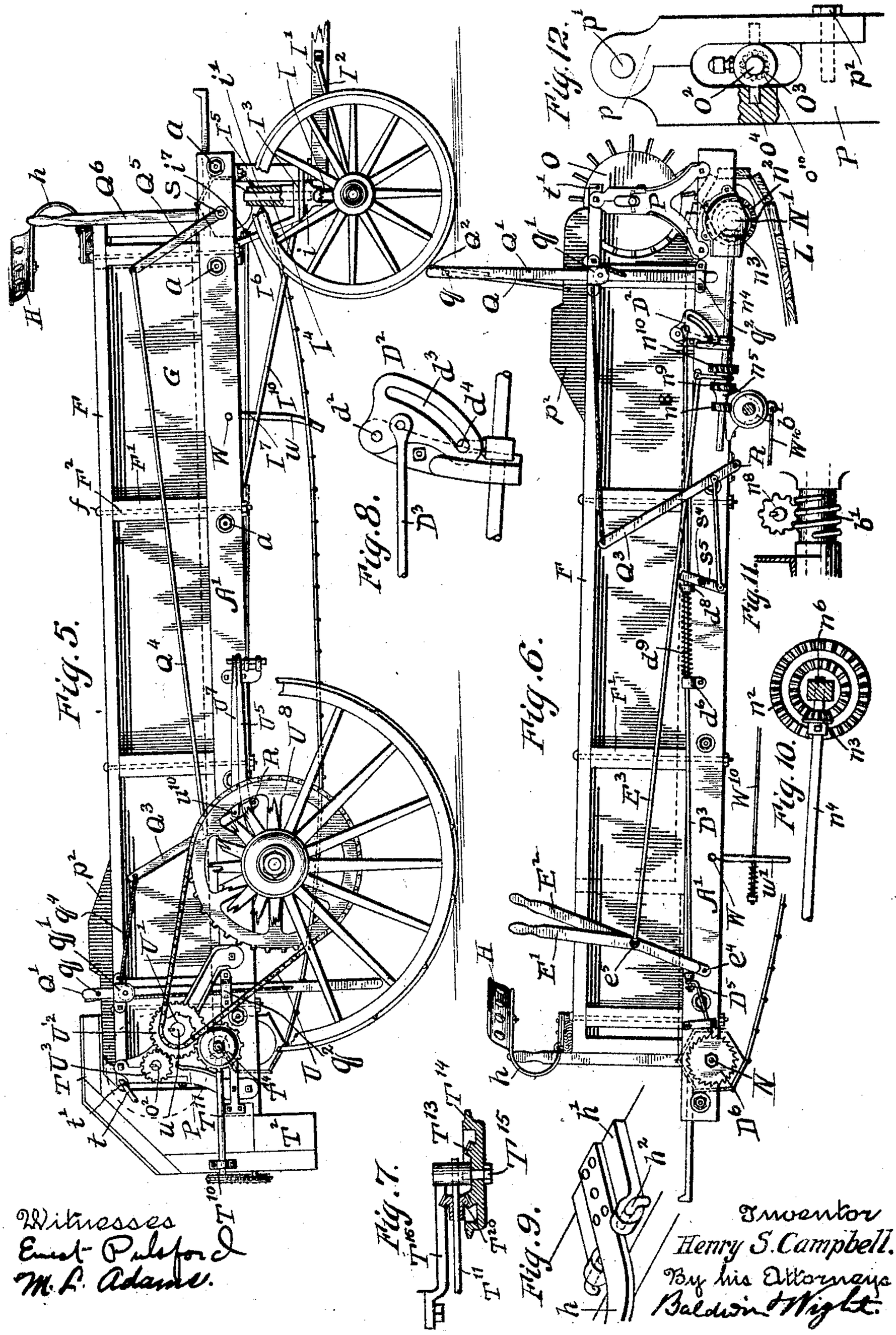

Fig. 5.

Fig. 8.

Fig. 12.

Fig. 11.

Fig. 6.

Fig. 10.

Fig. 7.

Fig. 9.

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4 SHEETS--SHEET 3.

Fig. 13.

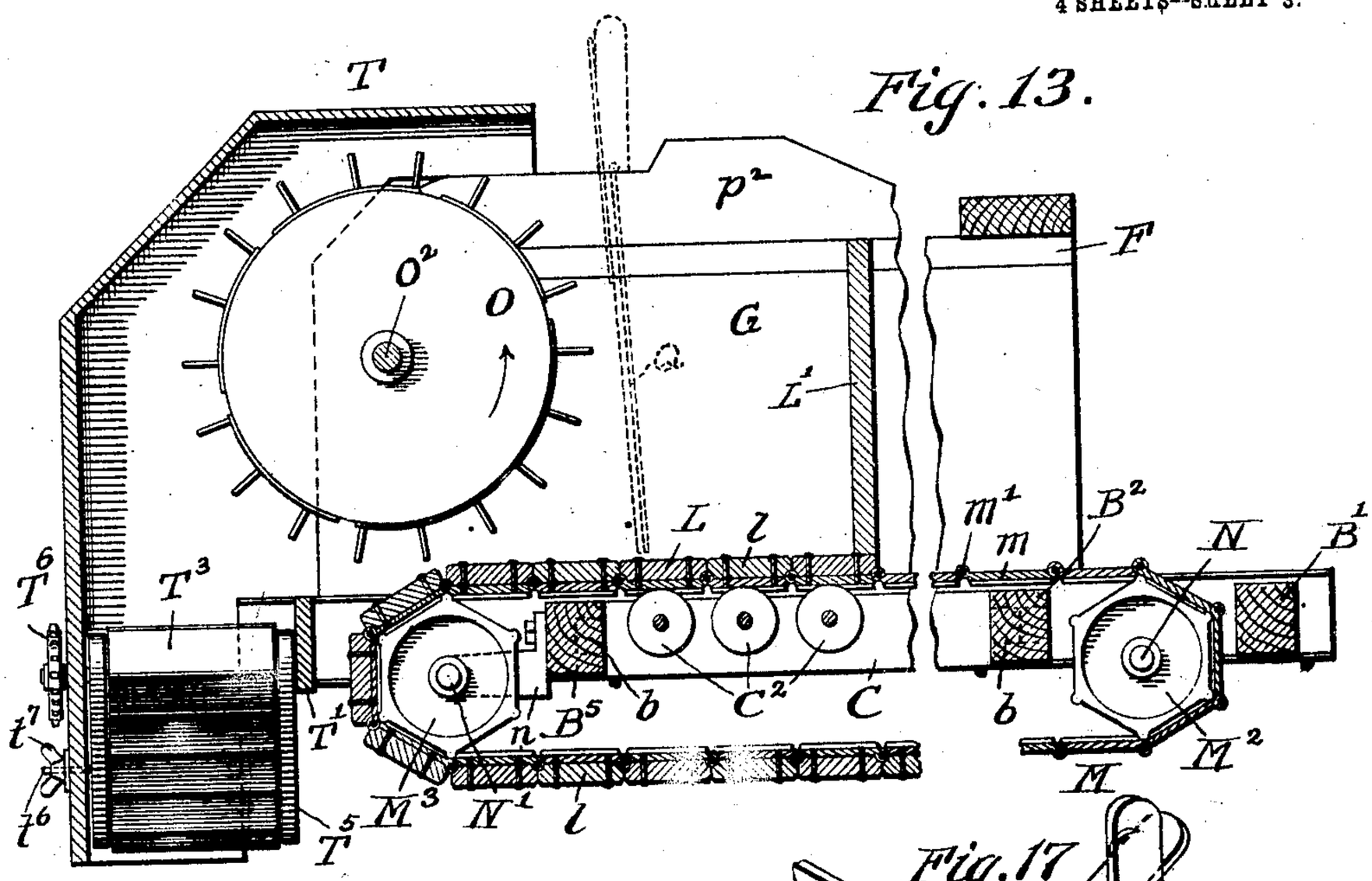


Fig. 14.

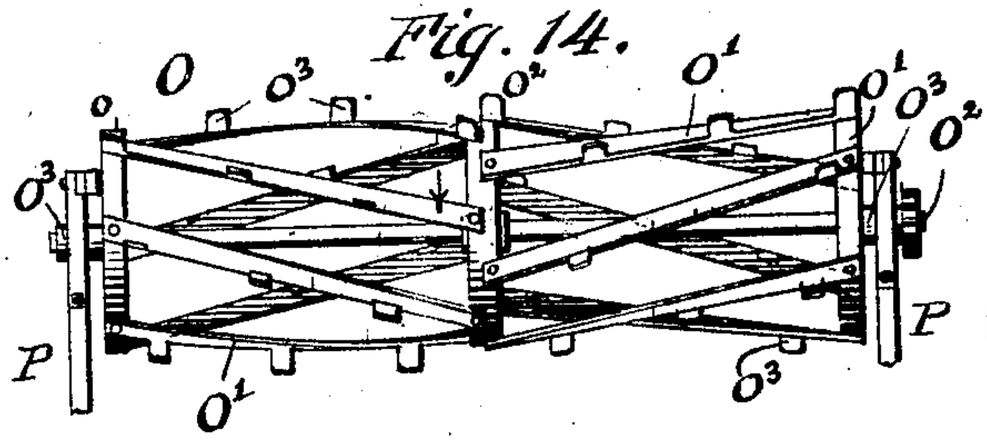


Fig. 15.

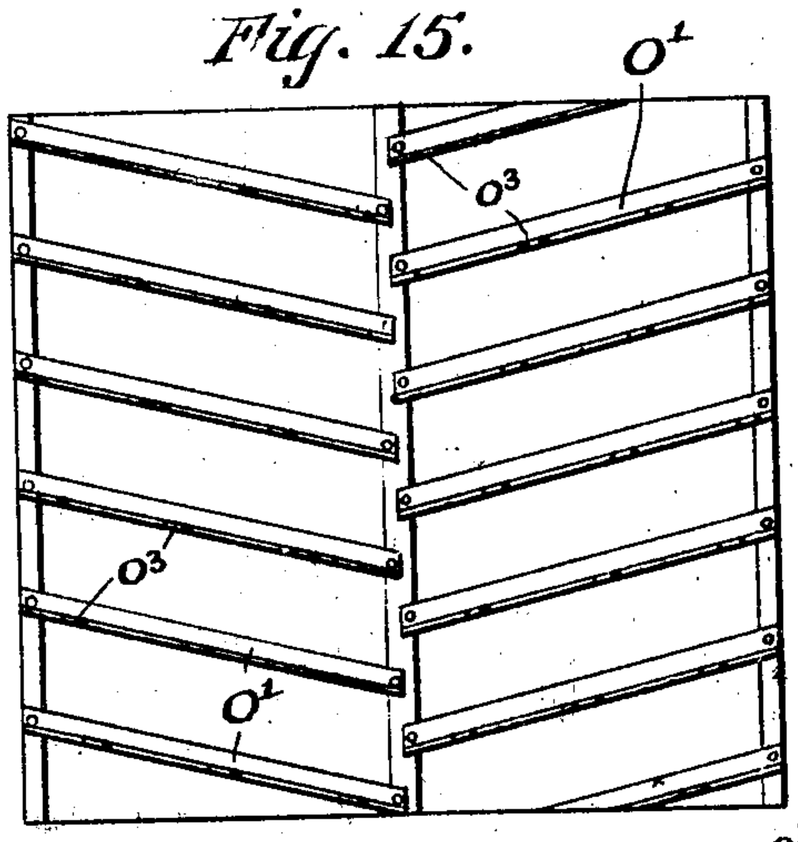


Fig. 17

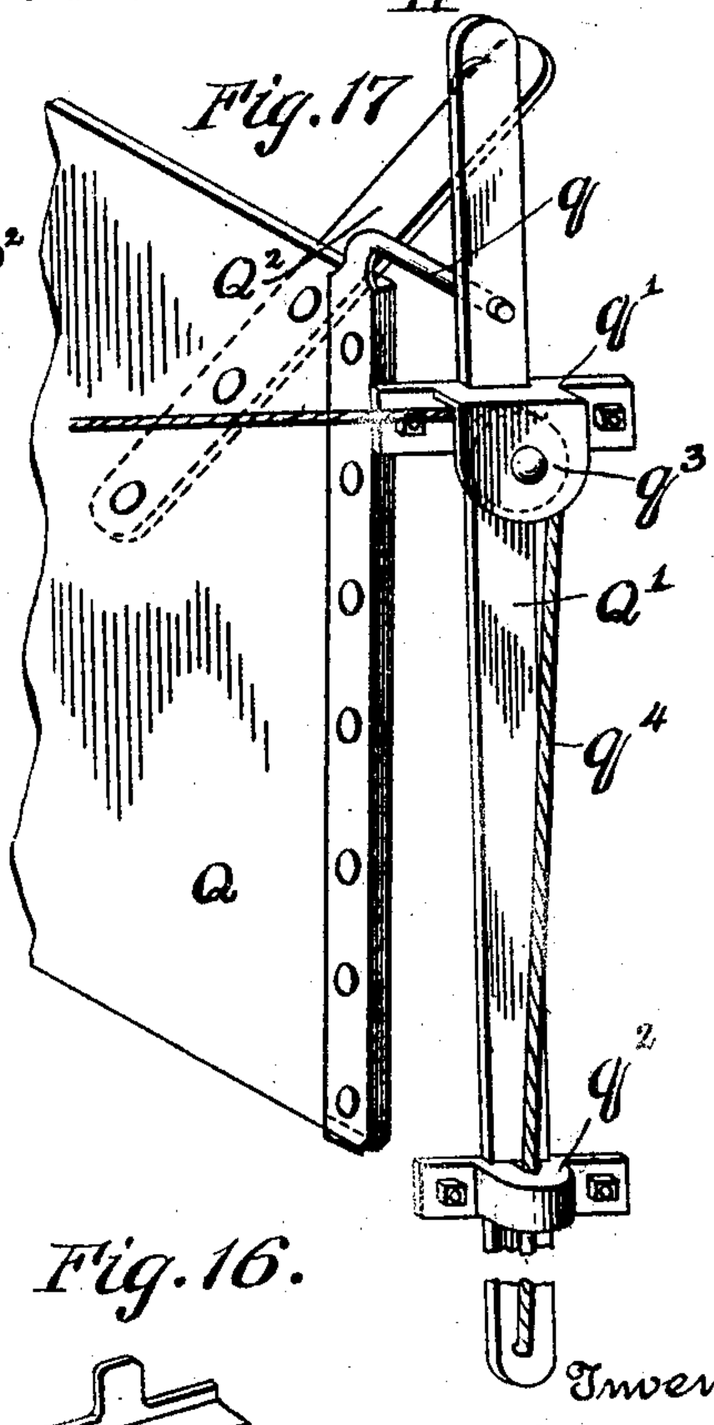
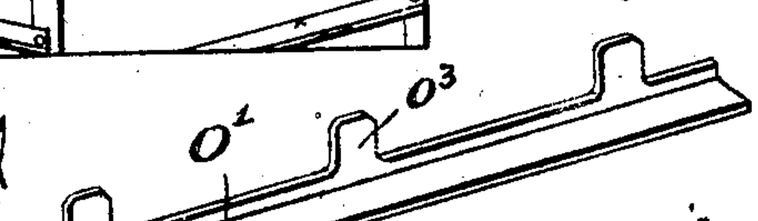


Fig. 16.



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Ernest Pulsford
M. L. Adams

Inventor
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4 SHEETS—SHEET 4.

Fig. 18.

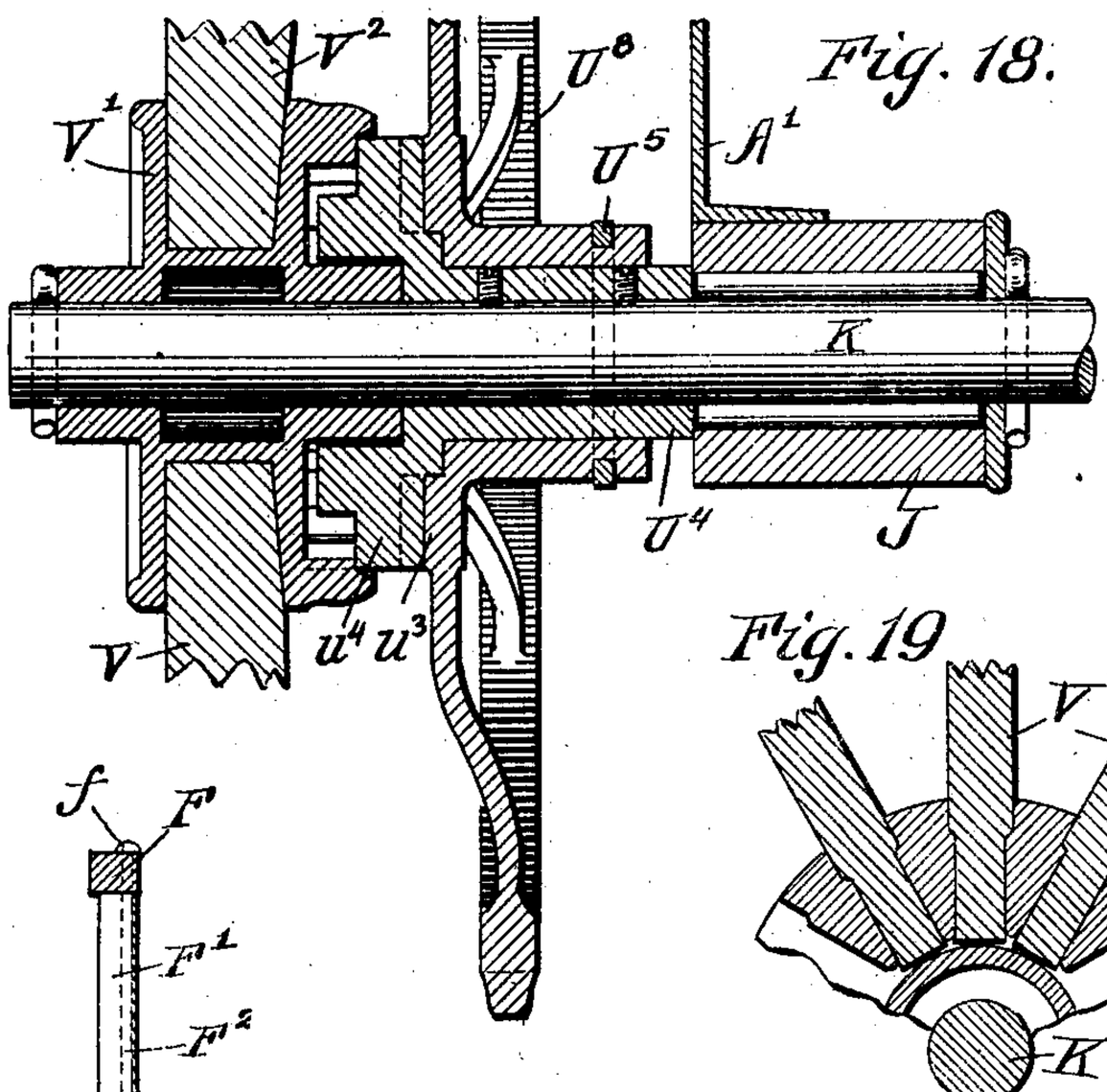


Fig. 20.

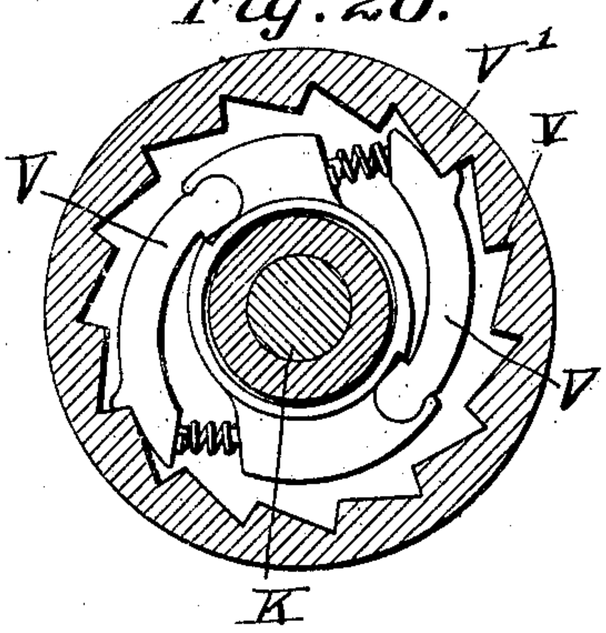


Fig. 19

Fig. 22.

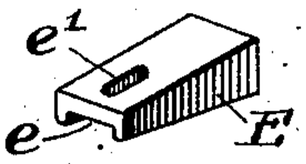


Fig. 23.

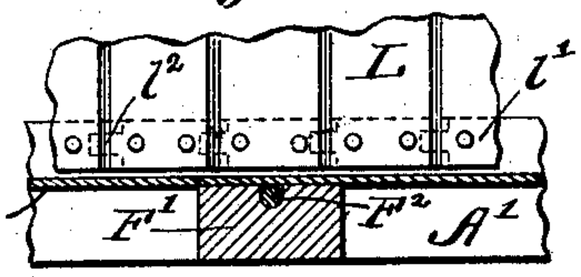


Fig. 21.

Fig. 24.

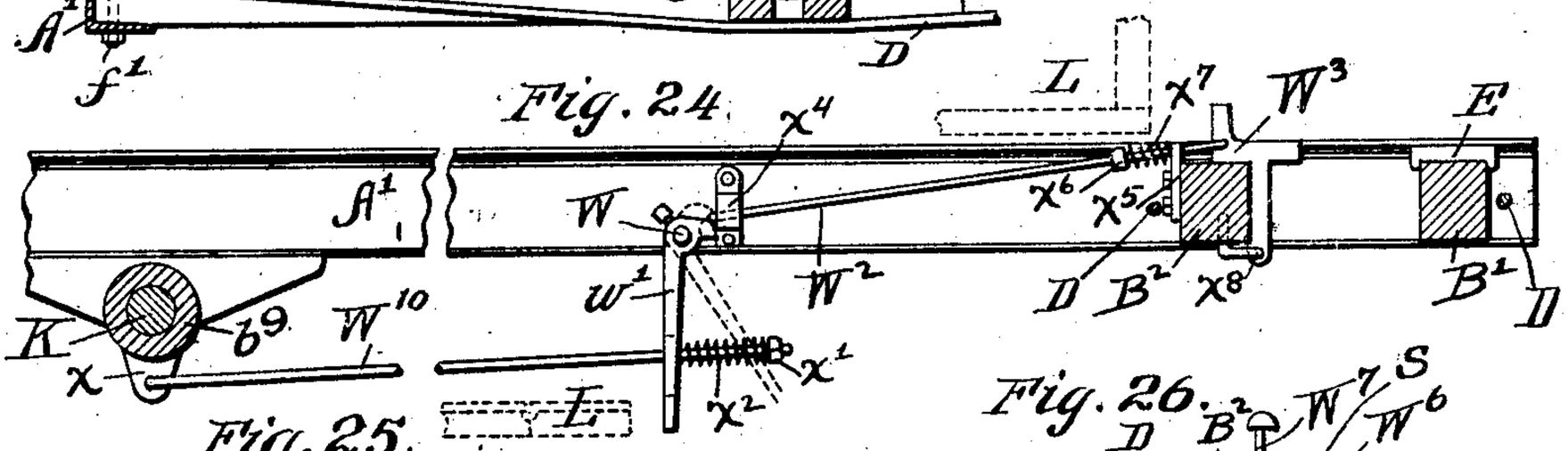


Fig. 25.

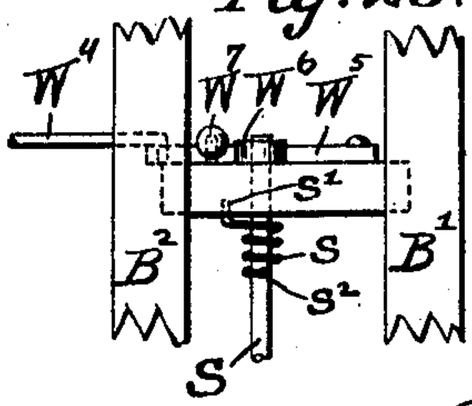


Fig. 26.

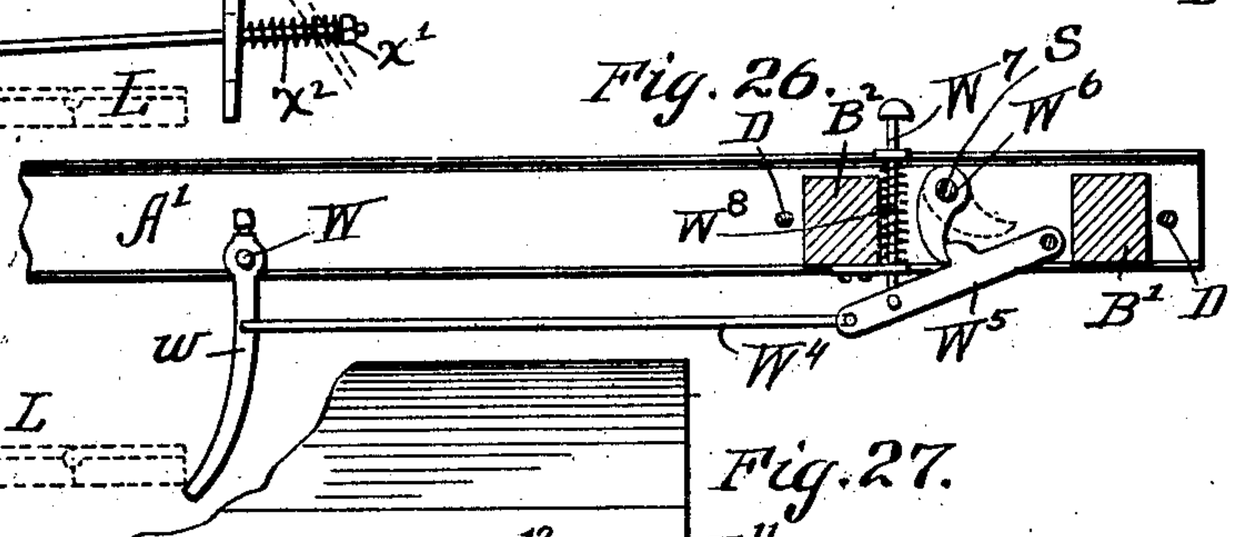
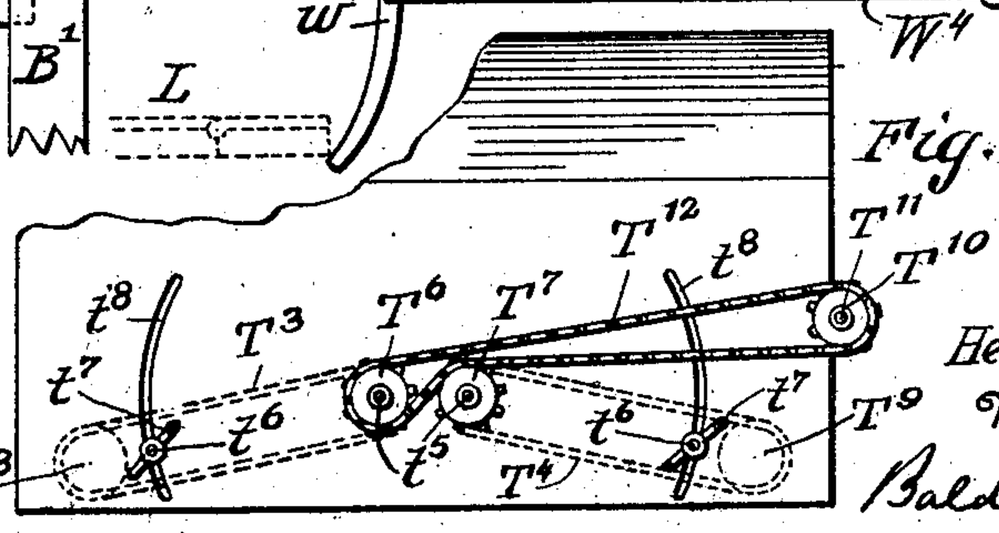


Fig. 27.



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UNITED STATES PATENT OFFICE.

HENRY S. CAMPBELL, OF NEWARK VALLEY, NEW YORK.

FERTILIZER-DISTRIBUTER.

SPECIFICATION forming part of Letters Patent No. 789,254, dated May 9, 1905.

Application filed June 14, 1904. Serial No. 212,448.

To all whom it may concern:

Be it known that I, HENRY S. CAMPBELL, a citizen of the United States, residing at Newark Valley, in the county of Tioga and State of New York, have invented certain new and useful Improvements in Fertilizer-Distributers, of which the following is a specification.

My present invention relates to fertilizer or manure distributers of the class in which the wagon-body is provided with a movable slatted bottom or carrier on which the manure is supported and by which it is carried slowly to a rotary beater, which stirs, loosens, and delivers it to the land or to conveyers which deposit it on the land. In such machines as heretofore constructed the movement of the slatted conveyer has been automatically stopped when the load was delivered and the carrier has been returned by mechanism operated by hand or by the wagon itself as it is moved forward, suitable devices being thrown into operation by the driver to cause the reverse movement of the carrier.

One object of my invention is to do automatically what has heretofore been done by hand—viz., to cause the carrier to automatically return as soon as the load has been delivered, while the wagon is still moving forward, without any aid or attention from the driver, who can thus give his entire attention to the team.

My invention, furthermore, comprehends mechanism whereby the driver can by merely shifting a lever start the beater, carrier, and conveyer, after which he need give no further attention to the distribution of the manure, such mechanism being so constructed that after the load is deposited the carrier will automatically stop, automatically reverse its movement and return, and then automatically stop at the end of the return movement.

The beater is of an improved construction, and it operates in connection with endless conveyers, on which the manure is deposited by the beater and which feed it positively toward one side of the wagon or simultaneously to opposite sides thereof.

I have also provided a shield of improved construction, which is interposed between the beater and the load of manure while the wagon is being loaded or driven to the field and which prevents the beater from being clogged. This shield is automatically raised when the distribution of the load commences, but is not fully raised until the beater has attained considerable speed. The shield is pressed normally forward by springs which yield when any obstruction to the free operation of the mechanism occurs and allows the shield to swing backward to relieve the strain. The arrangement is such that the shield may be lowered while the beater is revolving.

The wagon-body possesses novel features of construction, as does also the running-gear. The driver's seat is so made that it may be swung forward out of the way while the wagon is being loaded, and the rear or driving wheels are so constructed that they are prevented from slipping either forward or sidewise.

Another important feature of my invention is improved mechanism for changing the rate of feed of the manure without stopping the beater. By these improvements the amount of manure delivered by the wagon to the acre may be varied to a greater extent than with other machines of the class heretofore used.

Other novel features of the invention will be hereinafter more particularly referred to.

While the machine is especially intended to distribute manure, it may also be used to distribute fertilizers of other kinds. In the following specification the machine will be described mainly as adapted for operating upon manure.

In the accompanying drawings, Figure 1 is a plan view of my improved fertilizer-distributer with some of the parts in section and some parts broken away in order to better illustrate other parts. Fig. 2 is a detail view, partly in section, of the clutch mechanism connecting the rear or driving axle with the sprocket-wheel which actuates the devices for returning the slatted carrier after the load has been deposited. Figs. 3 and 4 are detail views of the mechanism for operating the clutch which connects the rear axle with the beater-actuating mechanism. Fig. 5 shows a right-hand side elevation of the machine with all its parts in proper position. Fig. 6 shows a left-hand side elevation of the machine with

some parts removed in order to better illustrate other parts and with some parts in section. Fig. 7 is a detail view of part of the gearing for actuating the conveyers at the rear end of the machine, which deliver the manure to the land. Fig. 8 is a detail view of some of the devices employed for moving into and out of operation the mechanism which drives the slatted carrier in its rearward movement. Fig. 9 is a detail view in perspective, showing the manner of hinging the driver's seat to the body of the wagon. Figs. 10 and 11 are detail views of the gearing for actuating the rear sprocket when driving the slatted carrier rearward. Fig. 12 is a detail view, on an enlarged scale, showing one of the roller-bearings for the beater-shaft. Fig. 13 is a view, on an enlarged scale, in section and with parts broken away, showing particularly the construction of the slatted carrier and manner of supporting it, the beater, the shield in front of it, and the conveyers in rear of the beater, which receive manure therefrom and deliver it to the land. Fig. 14 is a rear view of the beater. Fig. 15 shows a development of the beater and illustrates the manner of arranging the teeth in an improved way to insure contact with all parts of the manure in front of the beater, while preventing any clogging which would impede the rotary movement of the beater. Fig. 16 is a perspective view of one of the beater-bars. Fig. 17 is a perspective view illustrating the construction and operation of the beater-shield. Fig. 18 is a detail view, on an enlarged scale, illustrating particularly the manner of connecting the sprocket-wheel which actuates the beater with the driving-axle. Fig. 19 is a detail view illustrating the manner of constructing the driving-wheels. Fig. 20 is a detail view, on an enlarged scale, of the pawl-and-ratchet mechanism for connecting one of the driving-wheels with the sprocket-wheel which actuates the beater. Fig. 21 shows a partial transverse section of the machine. Fig. 22 is a detail view in perspective of one of the wedges employed in constructing the body of the wagon. Fig. 23 is a detail view illustrating the manner in which the slatted carrier is constructed, and this figure also shows one of the features of construction in the body of the wagon. Fig. 24 is a detail view illustrating part of the mechanism concerned in the automatic return of the carrier after the load has been deposited. Figs. 25 and 26 are detail views illustrating the manner in which the return movement of the carrier is stopped as soon as it has fully returned, and these figures of the drawings also illustrate the manner in which the return movement of the carrier may be arrested whenever desired. Fig. 27 is a rear elevation of part of the machine and illustrates particularly the construction and operation of the conveyers which receive the manure from the beater and deliver it to the land.

The distributing-machine shown in the drawings is in the form of a four-wheel wagon that may be easily moved to and from the field where the manure or fertilizer is to be distributed. The body of the wagon comprises two side sills A′ A′, preferably made of channel-iron, which are connected by cross beams or sills B′ B^2 B^3 B^4 B^5, which are preferably of wood. Midway between the side sills the cross-sills are connected by short pieces of wood C, the ends of which are tenoned into the cross-sills B′, &c., as indicated in dotted lines at *b* in Fig. 1 and Fig. 13. These pieces C, &c., are arranged a short distance apart, as illustrated in Fig. 1, and they support between them antifriction-rollers C^2, over which the carrier moves. Truss-rods D, which extend under the pieces C and alongside of the sills B′, &c., connect the side sills A′ A′ and are adjustably secured thereto, as indicated at *a* in Fig. 21. In order to firmly connect the cross-sills to the side sills and to tighten this connection should it become loose, I employ wedge-shaped blocks E, preferably of metal and of the kind shown in Figs. 21 and 22. These are grooved on their under sides at *e* and are slotted at *e′*. They rest on top of the sills B′, &c., and extend under the top flanges of the side sills. They may be driven home with a hammer and will serve to make the structure very rigid. The top rails F, which may be of wood, rest on uprights F′, which in turn rest on the side sills A′ A′. Rods F^2, each of which is headed at its upper end *f* and is provided with a nut *f′* at its lower end, extend through the rails F, side sills A′ A′, wedges E, and cross-sills B′, &c., and firmly bind these parts together. The sides of the wagon are lined at G with sheet metal.

The driver's seat H is secured to a curved spring *h*, which is attached to a plate *h′*, hinged at h^2 to a top cross-beam H′ in such manner that the seat may be turned over forward out of the way while the wagon is being loaded.

The front axle I carries one member, *i*, of a fifth-wheel, to which the tongue I′ is attached, and rods I^2 connect the tongue with the axle near the front wheels, as indicated in Fig. 1. The other member, I^3, of the fifth-wheel is formed with an upwardly-extending hollow boss *i″*, into which a king-bolt I^4 extends from the lower member of the fifth-wheel. The fifth-wheel member I^3 is connected to the wagon-body by braces or brackets I^5 and I^{10}, and it is formed with rearwardly and upwardly extending braces or brackets I^6, which are secured to the body of the wagon and to which are also attached draft-rods I^7, having adjusting-nuts i^7, that extend diagonally rearward and connect with bearing-brackets J, attached to the wagon-body and through which extends the rear axle K. By this arrange-

ment the draft is communicated to the rear axle mainly through the draft-rods I' instead of through the body of the wagon, the draft of the rear axle being thus applied directly to the king-bolt. In this way the firm and rigid construction of the wagon is preserved, and therefore there is no danger of any of the gearing or operative connections becoming displaced.

The movable bottom or manure-carrier L is of the same general construction as that heretofore used and is provided with the usual follower L'. As shown, it consists of a series of parallel slats *l*, attached at their opposite ends to links *l'*, which are hinged together at l^2, Fig. 23, and are supported at their ends on the inwardly-projecting upper flanges of the side sills A' A'. Midway between their ends the slats are connected to an endless chain M, consisting of links *m*, hinged together at *m'* and having grooved outer sides that fit the rollers C^2, mounted between the longitudinal pieces C, that connect the cross-sills B' B^2, &c. The slats only cover about one-half of the chain, which latter passes around spocket-wheels M^2 M^3, arranged near the front and rear ends of the wagon. The front sprocket-wheel M^2 is secured to a shaft N, which extends from a point just below the driver's seat to the left-hand side of the wagon, and the rear sprocket-wheel M^3 is secured to a shaft N', mounted in bearings in a bracket *n*, secured to the rear cross-sill B^5, and another bracket in the side of the wagon. The carrier is driven in a manner hereinafter described.

The beater O consists of two end and one center disk o o' o^2, connected by bars O', that are arranged diagonally on opposite sides of the center disk, the inner ends of the bars on one side of the center disk being connected to the center disk between the ends of the bars on the opposite side. The teeth o^3 on the bars are so arranged that as the beater revolves the entire surface of manure between the inner disks is engaged by the teeth, while the teeth are separated in such manner as to prevent clogging and give perfect freedom of movement to the beater. In Fig. 15 I have shown a development of the beater, and it will be seen that the teeth o^3 on succeeding bars on one side are arranged at different distances from the center disk and that the teeth on the other side, while also arranged in succeeding bars at different distances from the center disk, are all arranged at a different distance from the center disk from corresponding bars on the opposite side of the disk. The arrangement is such that the tooth of one bar acts on the manure beside the tooth that immediately precedes it. The beater revolves in the direction indicated by the arrows in Figs. 13, 14, and 15, and it will be seen that the inner ends of the beater-bars are set forward and the bars incline rearward. In this way the beater-bars are made to more easily enter the manure to stir, pulverize, and lift it and deliver it to the conveyers in rear of them.

The beater-shaft O^2 is supported in sleeves O^3, (see Fig. 12,) each of which is provided with rollers o^{10} and laterally-projecting arms or lugs o^4, that extend into sockets in the brackets P. Each of these brackets is firmly secured at its lower end to one of the side sills and extends up to the top of the wagon. Each bracket has a hinged portion *p*, jointed to the body of the bracket at *p'* and secured in place when closed by a screw p^2. By the construction shown the beater-shaft may be withdrawn from its bearings by swinging outwardly and upwardly the hinged section *p*. The sleeves O^3 are swiveled in the brackets P, giving slight freedom of movement, which will prevent undue binding or strain on the mechanism.

In front of the beater is arranged a shield, which when the wagon is being loaded is lowered or arranged within the wagon, as indicated in Fig. 13. It prevents the manure from being banked up against the beater, so that when starting to distribute the manure the beater can get up a high rate of speed before it commences to act upon the manure. This shield extends from one side of the wagon to the other and is of sufficient depth to extend from the movable bottom to the top of the wagon. It is pivotally connected at its upper end by means of rods *q*, Fig. 17, to two vertical bars Q', which extend through upper and lower guides *q'* q^2, attached to the sides of the wagon. Springs Q^2, attached to the rear sides of the shield, Figs. 13 and 17, bear against the rear edges of the upper ends of the bars Q'. Normally the springs are relaxed, and the shield occupies the position shown in Fig. 13 when it is lowered. If, however, when the shield is lowered, as shown in Fig. 13, there is any pressure exerted on it, it is free to swing on its pivots *q* forward. When this pressure is removed, the shield swings back to the position shown by dotted lines in Fig. 13, but is prevented from moving farther backward by the springs Q^2. When the shield is elevated and the wagon is distributing the manure, the parts will appear as shown in Fig. 6. If at this time any undue pressure is exerted on the shield, it is free to move about its pivots rearwardly against the pressure of the springs Q^2. As soon as the obstruction has passed the springs return the shield to its normal position. After a load has been distributed and the shield is lowered the beater is permitted to revolve by its own momentum for a time, so that while the shield is being lowered the beater is still rotating and turning up and conveying the manure. If this tends to impede the lowering of the shield, the latter will swing on its pivots *q* in the manner before described to relieve the pressure. The upper bearings *q'* carry sheaves

q^3, over which extend wire ropes q^4, that also extend through openings in the lower guides q^2 and are attached to the bars Q′ at their lower ends. These ropes are connected to levers Q^3 on opposite sides of the wagon, which levers are securely fastened at their lower ends to a horizontal rod R, that extends from one side of the wagon to the other below the upper lap of the movable bottom or carrier L. By these devices the shield may be lowered while the beater is in motion.

One of the levers Q^3 is connected, by means of a rod Q^4, with an arm or lever Q^5, attached to a horizontal shaft S just below the driver's seat, and to which is secured a lever Q^6 within convenient reach of the driver. By moving this lever forward the levers Q^3 are moved forwardly at their upper ends and cause the shield to be raised. When the lever Q^6 is moved rearwardly, the shield drops of its own weight. As before stated, the shield is hinged and is held by springs normally in the position shown in Fig. 6; but in the operation of the machine should the manure clog in front of the shield the latter will yield sufficiently to allow it to pass and will then resume its normal position. The lower end of the shield when elevated is below the raised sides of the wagon, (indicated at P^2.) These sides are for the purpose of preventing the manure from falling over sidewise, while the shield prevents it from passing over the top of the removable hood T, which is applied to the rear end of the wagon over the beater. This hood may be made in any suitable way, and it is provided with pivoted hooks t, that engage pins t' at the upper rear corners of the sides of the wagon. The lower portion of the hood rests on a cross-piece T′. By this means the beater is inclosed, and the undue scattering of the manure is prevented. The hood is prolonged downwardly at T^2, where it is formed into a casing for two endless conveyers T^3 T^4, which convey the manure to opposite sides of the wagon in rear thereof. The conveyers may be made of slatted aprons, as indicated, which traverse rollers mounted in frames T^5. These frames are supported at their inner ends on the shafts t^5, which carry the sprocket-wheels T^6 T^7. The lower rollers T^8 T^9 are also supported on the frames T^5, and these frames carry screw-rods t^6, provided with nuts t^7. The rods t^6 extend through curved slots t^8 in the back of the hood and support the lower portions of the frames T^5. By this means the conveyers may be adjusted to any desired extent. They may be arranged at an angle to each other, so as to distribute manure in opposite directions to opposite sides of the wagon, or one of the conveyers may have its outer end elevated in such manner as to deliver onto the other conveyer, and thus feed the manure in one direction only. Furthermore, both of the conveyers may be adjusted to any desired angle to positively feed the manure in rows any desired distance apart. When the conveyers are adjusted to feed the fertilizer in one direction only, the chain T^{12} must of course be made to engage the proper sides of the pinions, or the chain must be crossed. In the drawings the parts are so adjusted that the machine feeds to both sides of the wagon. If it is desired to have the fertilizer feed to one side only—say the left-hand side—the apron on the right-hand side should be elevated at its outer end and the parts made fast by the screw t^7. Then the chain should be taken from the top of the right-hand center pinion T^6 and made to engage the under side of this pinion. Then the aprons will both move on their upper sides in the same direction and feed all the fertilizer to the left. If it is desired to feed all the fertilizer to the right, the apron T^4 should have its outer or left-hand end elevated and made fast by the nut t^7. Then the chain T^{12} should be made to engage the under side of the pinion T^7, while the chain is also made to engage the upper part of the pinion T^6. If necessary, the links may be taken from or added to the chain, this being a common expedient.

The sprocket-wheels T^6 T^7 are driven by an endless chain T^{12}, which passes around the sprocket-wheel T^6 and over or in contact with the sprocket-wheel T^7. This chain also extends around a sprocket-wheel T^{10} on a shaft T^{11}, mounted in suitable bearings on the right-hand side of the machine and carrying a bevel-pinion T^{20}, engaging a bevel-gear T^{13} on a sprocket-wheel T^{14}, mounted to revolve on a stud-shaft T^{15}, supported by a bracket T^{16}, attached to the hood T. The sprocket-wheel T^{14} engages a sprocket-chain U, which passes around a sprocket-wheel U′ on a shaft u, to which is also attached a spur-wheel U^2, that meshes with a spur-wheel U^3 on the beater-shaft O^2. The sprocket-chain U passes around a large sprocket-wheel U^8, that encircles a sleeve U^4 on the rear axle or main driving-shaft K. This sprocket-wheel, as shown in Fig. 18, has a clutch member u^3, that engages a similar clutch member u^4 on the sleeve U^4. When the clutch members are engaged in the manner shown in Fig. 18 and the wagon is moving forward, motion is communicated by means of the gearing described to the beater and also to the conveyers. The sprocket-wheel is adapted to slide to a limited extent on the sleeve U^4 and it is shifted by means of a lever U^5, Fig. 3, which is pivoted at u^5 to the side of the wagon and is provided at its front end with a bracket u^6, having an elongated slot u^7, through which extends a crank-rod U^6, that is pivotally mounted in lugs u^8, projecting from a bracket u^9, attached to the side of the wagon. The upper end of the crank-rod is pivotally connected with a rod

U⁷, that is jointed at u^{10} with the lever Q^3 on the right-hand side of the machine and a short distance above the rod R.

The lever Q^3 is connected with the hand-lever Q^6 in the manner before described. When the hand-lever is moved forward, the lever U^5 is operated in such manner as to cause the clutch members u^3 u^4 to engage, and when this is done the beater and conveyer will be set in motion. When the hand-lever Q^6 is moved rearward, the clutch is uncoupled from the motive power and the shield is lowered; but the beater and conveyers may continue to run until their momentum is overcome. The sleeve U^4 is connected with the driving-wheel on the right-hand side of the machine by means of pawl-and-ratchet mechanism, such as illustrated in Figs. 18 and 20. The pawls V are carried in the enlarged outer end of the sleeve U^4, and they are adapted to engage ratchet-teeth v in the hub V′ of the driving-wheel. The details of construction of this ratchet mechanism are clearly shown on the drawings. The object is to cause the shaft K to revolve when the wagon is moving forward, but to prevent the shaft from revolving when the wagon is backed. Both of the driving-wheels are provided with longitudinal and transverse ribs v' v^2 to give them sufficient traction to prevent them from slipping sidewise or circumferentially. The spokes v^2 are connected with the hub in the manner clearly indicated in Figs. 18 and 19.

The shaft N′, heretofore referred to, on which is mounted the rear sprocket M^3, carries on its outer end a bevel-gear n^2, which meshes with a bevel-pinion n^3 on a shaft n^4, carrying a cone-pinion n^5. The pinion n^2, as shown in Fig. 10, has two concentric series of teeth adapted to mesh with the pinion n^3. The pinion n^3 may be adjusted on the shaft n^4 to gear with either set of teeth. The rear end of the shaft n^4 is supported in a bracket n^6, as clearly indicated in Fig. 10, and the pinion is inclosed for the most part by a shell or housing n^7, attached to the side of the wagon. The cone-gear n^5 has three series of teeth n^8 n^9 n^{10}, all formed on the same hub, which is adapted to slide on the shaft n^4. Either one of these series of teeth is adapted to engage with a worm b', secured, as shown in Fig. 2, to a sleeve b^2, rigidly attached to the rear axle K. This axle extends through the hub b^3 of the left-hand driving-wheel, which is of the same construction as that on the opposite side and which is adapted to be connected with the sleeve b^2 by pawl-and-ratchet mechanism b^4, similar to that shown in Figs. 18 and 19. The axle extends through roller-bearings b^5 in a bearing-sleeve J, extending downwardly from the side sill A′. The inner end of this bearing-sleeve J is provided with a series of inclined surfaces or teeth b^7, with which engage similar teeth b^8 on a collar b^9, that is free to turn to a limited extent on the axle K. To this axle is rigidly secured a clutch member C^5, between which and the collar b^9 is interposed a sprocket-wheel C^6, which is geared by the chain C^7 to the sprocket-wheel M^3 on the shaft N′, before referred to. By turning this collar the sprocket-wheel C^6 may be made to engage with the clutch member C^5, and then the shaft N′ may be driven from the axle K in such manner as to cause the movable bottom L to return after the load has been delivered in the manner hereinafter more particularly described. In the normal operation of the machine, however, when the load is being distributed the shaft N′ is operated, by means of the worm b' in the manner before described, to cause the apron or movable bottom to carry the load toward the beater or distributer. The cone-pinion n^5 may be lifted out of engagement with the worm b', so as to stop the feed of the manure toward the distributer whenever desired. For this purpose I employ a bell-crank lever D^2, pivoted at d^2 to the side of the wagon and having a slot d^3, through which extends a hook d^4 on an arm d^5, attached to the shaft n^4. To the bell-crank lever D^2 is pivotally connected a rod D^3, which extends horizontally forward through a guide-bracket d^6, and at its front end it is adapted to engage the lower end of a lever E′, as shown in Fig. 6. This lever E′ is pivotally connected at e^5 with the lever E^2, which is pivoted at e^4 to one of the side sills A′. The lever E′ may be moved about its pivot without moving the lever E^2, and if the lever E′ be moved rearwardly at its upper end its lower end will draw on the rod D^3 and move the bell-crank lever D^2 downward, so as to lift the cone-gear n^5 out of engagement with the worm b'. When this is done, the rearward movement of the movable bottom or conveyer will be stopped. The rod D^3 carries a collar d^8, between which and the guide-bracket d^6 is interposed a spring d^9, which tends to raise the bell-crank lever D^2, and thus to hold the shaft n^4 in its lowermost position, with the cone-gear n^5 in engagement with the worm b'. When the lever E′ is moved rearward in the manner just described, it engages a dog D^5, which is adapted to engage a toothed wheel D^6 on the shaft N, to which the front sprocket-wheel M^2 is attached. In this way when the cone-gear is disengaged from the worm the further rearward movement of the movable bottom is prevented. In order to change the rate of feed so that any desired quantity per acre may be distributed by the machine, I have provided devices for shifting the cone-gear n^5 either while the wagon is at rest or when it is in motion. For this purpose the levers E′ E^2 are connected at e^5 with a rod [illegible], which extends back to the gear n^5 and is connected therewith in the manner indicated in Fig. 6. After the lever E′ has been moved rearward without moving the lever E^2 and the cone-

gear has been lifted from engagement with the worm b' and the dog D^5 has been made to engage the ratchet D^6 the two levers E' E^2 may be moved backward or forward to cause either of the series of worm-teeth n^8, n^9, or n^{10} to engage the worm b'. Thus three different changes of speed are provided which may be effected at any desired time, and inasmuch as the pinion n^3 is adjustable on the shaft n^4 it may be made to engage either set of teeth on the gear n^2, and thus I provide for six different changes of speed that may be given to the movable bottom.

Near the front of the machine in suitable bearings is mounted a rock-shaft W, from which depend fingers w, that extend into the path of the movable bottom and against which the lower front end of the movable bottom strikes when it has reached the limit of its movement in feeding the manure to the distributer. One of the fingers w is connected by a rod W^4 with a latch W^5, which engages a dog W^6 on the shaft S, to which the arm Q^5 is secured. This shaft S is encircled by a spring s, attached to the main frame at s' and to the shaft at s^2. This spring is under tension when the manure is being fed backward, so that when the latch W^5 is withdrawn the shaft S turns to a sufficient extent to rock the shaft R through the connections before described. This shaft R is connected on the left-hand side of the wagon, Fig. 6, with a lever s^5, pivoted at s^4 to the wagon and adapted to engage the collar d^8 on the rod D^3. When the shaft S is rocked in the manner above described, the lever s^5 is moved forward and causes the cone-gear n^5 to be disengaged from its driving-worm b'. In this way the rearward movement of the movable bottom L is arrested, and it is caused to reverse its movement in the following manner: On the shaft W is a finger w', which is connected with a rod W^{10}, that connects with an arm x, extending downward from the collar b^9. The rod W^{10} extends through an aperture in the finger w' and carries on its front end a nut x', between which and the finger is interposed a spring x^2, affording a yielding connection between the rod and finger. When the shaft W is turned by the carrier, the finger w' draws on the rod W^{10} and turns the collar b^9, thus causing the sprocket C^6 to engage the clutch member C^5, thereby causing the shaft N' to be driven from the axle K by means of the chain C^7. This gives a reverse movement to the shaft N', and the movable bottom is caused to travel in a reverse direction. When the finger w' is moved in the manner just described, its upper end is engaged by a rod W^2, which at its rear end extends through a guide x^4 and which at its front end passes through another guide, x^5. Between this guide and a collar x^6 on the rod is interposed a spring x^7, which tends to move the rod rearward. The rod W^2 is connected at its front end with a foot-lever W^3, pivoted at x^8 to the cross-sill B^2. The rod W^2 holds the shaft W in such position as to permit the reverse movement of the movable bottom until it has reached the limit of its reverse movement, at which time its upper front end engages the lever W^3 and causes it to withdraw the rod W^2 from the finger w', and thus the clutch at C^5 will be uncoupled and the movement of the movable bottom will be arrested. It will thus be seen that after the machine is once set into operation the load will be delivered automatically, and after it is delivered the movable bottom will be automatically returned to its closed position and will then automatically stop without any attention whatever from the driver. If at any time the driver wishes to arrest the return movement of the carrier, he can do so by kicking forward the foot-lever W^3. This will release the finger w' and the clutch at C^5 will uncouple, the gearing for the rearward movement of the carrier being still uncoupled, inasmuch as the dog W^6 would be in the position indicated by dotted lines in Fig. 26, and the shaft S will hold the parts connected therewith in such a position as to uncouple the driving mechanism. The driver can, however, cause the return movement of the carrier to be continued by placing his foot on the rod W^7, which is normally held up by a spring w^8 and which is pivotally connected with the latch W^5. Such a movement will cause the shaft W to be turned and the finger w' to be engaged by the rod W^2 in the manner indicated in Fig. 24, when the return movement of the carrier or movable bottom will be resumed, and it will be automatically stopped by the foot-lever W^3 at the proper time in the manner before described. In like manner the rearward or feed movement of the carrier may be arrested at any time by means of the lever E'. The rearward or feed movement of the bottom may also be stopped by the rod W^7, as it will be seen that if the parts are in the position shown by full lines in Fig. 26 the driver may by depressing the rod W^7 disengage the dog W^6, and the shaft S will be turned by the spring s in such manner as to cause the driving mechanism to be uncoupled. It will thus be observed that the movements of the machine are under perfect and easy control of the driver. When arriving at the field with a load, by shoving forward the lever Q^6 the driver automatically throws into gear the shield-lifting devices, the beater-operating mechanism, the conveyer-actuating devices, and the mechanism for actuating the movable bottom or carrier. If desired, the entire load may then be deposited, and as soon as this is done the feed movement of the movable bottom will be automatically stopped and the movable bottom will be caused to reverse its movement automatically and to automatically stop when the reverse movement is completed. If the driver

at any time wishes to discontinue the feed of the manure, he can do so in an obvious way by means of the lever E′ or the rod W⁷. In like manner he can, if desired, arrest the return movement of the movable bottom by means of the foot-lever W³ and can then cause the reverse movement to be continued by means of the rod W⁷. If at any time the driver desires to arrest the movement of the movable bottom without arresting the movement of the beater, he can do so by means of the lever E′, which will lift the cone-gear n^5 from engagement with the driving-axle. If the driver wishes at any time to change the rate of feed, he can easily do so by first shifting the lever E′ and then operating the lever E². It will thus be seen that the mechanism will operate efficiently and automatically to a large extent, leaving the driver to give his entire attention to the team. The mechanism which I employ for effecting these automatic actions, while apparently somewhat complicated are, in fact, simple in construction and operation and work positively and satisfactorily at all times.

I claim as my invention—

1. In a fertilizer-distributer, the combination of a rotary beater, its actuating mechanism, a movable bottom, means for moving it rearward to discharge the fertilizer, devices for automatically stopping the rearward movement of the bottom and for disconnecting the beater from its actuating mechanism, means independent of the beater-actuating mechanism for automatically reversing the movement of the bottom and means for automatically stopping the reverse movement of the bottom.

2. In a fertilizer-distributer, the combination of a movable bottom, means for moving it rearward to discharge the fertilizer, devices for automatically stopping the rearward movement of the bottom, means for automatically reversing the movement of the bottom, devices for automatically stopping such reverse movement, a rotary beater and means for automatically disconnecting the beater from its actuating mechanism during the reverse movement of the bottom.

3. In a fertilizer-distributer, the combination of a rotary beater, its actuating mechanism, a movable bottom, means for moving it rearward to discharge the fertilizer, devices for automatically stopping the rearward movement of the bottom and for disconnecting the beater from its actuating mechanism, means for automatically reversing the movement of the bottom and causing it to return while the beater is at rest, and devices under the control of the driver for stopping such return movement at any desired point.

4. In a fertilizer-distributer, the combination of a rotary beater, its actuating mechanism, a movable bottom, means for moving it rearward to discharge the fertilizer, devices for automatically stopping the rearward movement of the bottom and for disconnecting the beater from its actuating mechanism, means for automatically reversing the movement of the bottom to cause it to return while the beater is at rest, means under the control of the driver for stopping the return movement, and devices also under the control of the driver to cause the return movement to continue.

5. In a fertilizer-distributer, the combination of a movable bottom, its endless driving-chain, sprocket-wheels over which the chain extends, shafts on which the sprocket-wheels are mounted, gearing connecting one of the shafts with the driving-axle of the machine, devices for adjusting this gearing to vary the speed of the feed movement of the bottom, other gearing connecting the driving-axle with said shaft which actuates the driving-chain, and means for automatically throwing one set of gears out of operation and the other set into operation at the proper time.

6. In a fertilizer-distributer, the combination of a driving-axle, a beater geared thereto, means for throwing the beater into and out of operative connection with the driving-axle, a movable bottom, gearing connecting it with the driving-axle to feed it rearward, other gearing for returning it, means for simultaneously connecting the beater and movable bottom with the driving-axle to cause it to feed the fertilizer rearward, means under the control of the driver for changing the gearing to cause the movable bottom to vary its speed without stopping the beater, and means for causing the automatic return of the bottom after a load has been discharged and while the beater is at rest.

7. In a fertilizer-distributer, the combination of a movable bottom, gearing connecting it with the driving-axle to cause it to move rearward, a rotary beater, gearing connecting it with the driving-axle, a vertically-movable shield in front of the beater, conveyers which receive the manure from the beater and move it positively onto the land, a hand-lever within convenient reach of the driver and connections between this hand-lever and the gearing whereby the driver may simultaneously set into operation the movable bottom, the beater and the conveyers and lift the shield from in front of the beater.

8. In a fertilizer-distributer, the combination of the wagon-body, a movable bottom therein, a rotary beater, a shield in front of the beater, means for raising and lowering the shield and springs which tend to move the lower end of the shield forward but which yield to permit the shield to swing backward when necessary.

9. In a fertilizer-distributer the combination of means for feeding the load toward the rear end of the machine, a rotary beater, endless conveyers which receive the fertilizer

from the beater and feed it to opposite sides of the machine, and means for adjusting the angle of these conveyers.

10. In a fertilizer-distributer the combination of means for feeding the load toward the rear end of the machine, a rotary beater, two endless slatted conveyers in rear of and below the beater, means for adjusting them, and gearing for actuating the conveyers.

11. In a fertilizer-distributer the combination with a movable bottom, of a body in which the bottom moves, comprising side sills, cross-sills connecting them, truss-rods also connecting the side sills, top rails, wedges for strengthening the connection between the side sills and cross-sills, uprights between the top rails and side sills and tie-rods connecting the top rails and side sills.

12. In a fertilizer-distributer the combination with a movable bottom, of a body therefor, comprising channel-iron side sills, cross-sills connecting them, truss-rods also connecting the side sills, grooved slotted wedges interposed between the cross-sills and the side sills, top rails, uprights interposed between the top rails and the side sills and tie-rods extending through the top rails, uprights, wedges, cross-sills and side sills.

13. In a fertilizer-distributer, the combination of a movable bottom, a driving-axle, a worm thereon, a cone-gear having a series of sets of teeth adapted to gear with the worm, a shaft on which the cone-gear is carried, a pinion adjustably secured to said shaft, a gear having two concentric series of teeth with either of which the pinion is adapted to engage, means connecting said gear with the movable bottom, a hand-lever connected with the shaft by means of which the cone-gear may be lifted out of contact with the worm, and another hand-lever by means of which the cone-gear may be shifted to cause either of its series of teeth to engage the worm.

14. In a fertilizer-distributer the combination of a movable bottom, a driving-axle, a worm connected therewith, a pinion having a series of sets of teeth adapted to engage said worm, connections between said pinion and the movable bottom by which the movable bottom is operated to discharge the load, a shaft supporting the front end of the movable bottom, a ratchet-wheel thereon, devices for lifting the pinion out of engagement with the worm, a lever for operating said devices, a dog engaging said ratchet-wheel as soon as the pinion is lifted from engagement with the worm and means for shifting the pinion for varying the speed of the movable bottom.

15. In a fertilizer-distributer, the combination of a movable bottom, a driving-axle, sprocket-wheels over which the movable bottom extends, gearing connecting one of said sprocket-wheels with the driving-axle for moving the movable bottom to discharge the load, other gearing connecting said sprocket-wheels with the driving-axle for causing the movable bottom to return, means for holding out of operation the mechanism which causes the return of the movable bottom while the other actuating mechanism is in operation and means for automatically throwing out of operation the means for discharging the load and throwing into operation the means for causing the return of the movable bottom.

16. In a fertilizer-distributer, the combination of a rotary beater, a vertically-movable shield in front of it, which is mounted to swing toward and from the beater both when elevated or lowered, springs for holding it in a substantially vertical position both when elevated or lowered, but which yield to permit the shield to swing and means for simultaneously uncoupling the beater and lowering the shield.

In testimony whereof I have hereunto subscribed my name.

HENRY S. CAMPBELL.

Witnesses:
LEWIS H. SMITH,
W. B. ELWELL.