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Seeder Sowing Depth Adjusting Device

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Abstract: The function of the seeder is a certain amount of sowing or plant hole distance, the crop seed evenly into certain depth of groove, covered with just the right amount of wet earth, and at the same time can also be applied seed manure and proper repression, sometimes can also be sprayed with pesticides and herbicides, provide good conditions for seed germination, to achieve high and stable yield, improve the labor productivity of planting operation, reduce the labor intensity of users.
Keywords: Seeder; Depth adjustment; Profiling; Furrower.

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1. INTRODUCTION

The key components of the precision seed drill are the single structure of the parallel four-joint profiling seeder, the undulation of working components that contact the soil on both sides of the replica wheel of the planter everywhere, but the stability of confidential corn planter work, and a constant groove depth, the replication effect is directly related to the quality of the surface implant surgery, therefore, in the planter is extremely necessary to set a reasonable parallel quadruple analysis mechanism is also very important[1].

2. PARALLEL FOUR BAR PROFILING MECHANISM

The parallel four-bar configuration mechanism adapts to different terrain influences the seeding depth, realizes the pressure and adjustment of the corn no-tillage seeder[2], ensures the no-tillage sowing depth and machine stability of the corn, overcomes the shortcomings of the existing no-tillage planting technology.

2.1 Comparison of two types of profiling

Requirements for copying agencies: 1 In order to meet the scope of the required profile, the range of general (8 - 12) cm upper and lower two forms; 2 The performance of the work is stable and reliable, the performance of the profiling of the parallel four-bar profiling mechanism remains stable, the bottom of the seed groove is flat, and the depth of the seed-opening groove is consistent; 3 does not affect the sowing linear operation performance [3];
The parallel four-bar linkage profiling mechanism can be divided into a four-bar linkage structure of a single-degree-of-freedom parallel mechanism and two types of four-link double-

degree-of-freedom parallel replication mechanism. Based on the same type of different configurations of the same type, the multi-hinge parallel four-bar linkage mechanism can be divided into a front type and a rear type.

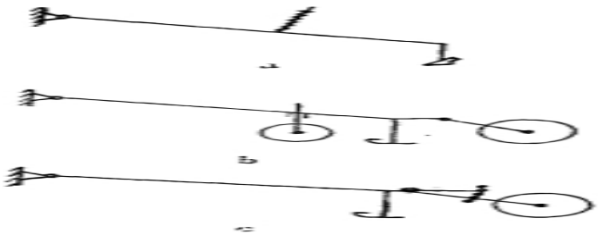

Fig 1. Single Hinge Profiling Mechanism

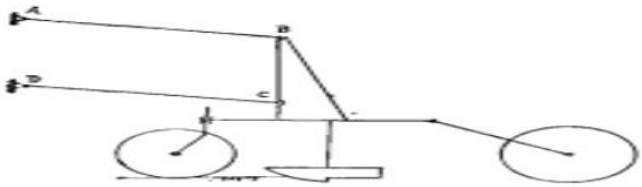

Fig 2. Pre-imitation

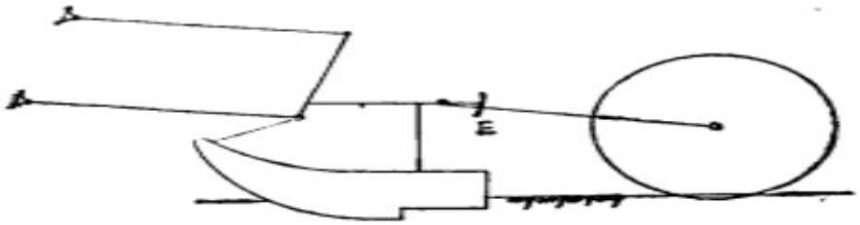

Fig 3. After imitation

3. DESIGN OF PARALLEL FOUR-BAR PROFILING MECHANISM

3.1 Parallel four-bar profiling mechanism and its principle

The mechanism consists of a frame, a profile bar, and a copy limit frame. The framing plate material is connected with the holes in the frame of the device and can be rotated relative to each other, while the copy type fitting is connected with the parallelogram profile [4].

3.2 Determination of draft angle in profile

P in the figure is traction. G is the weight of the rack, R is the resistance of the opener, and Q is the counter force of the soil on the replica wheel.

In order to stabilize the working condition of the opener, a certain contact pressure is required on the profile limiting wheel. Assuming that the force of the contact is too great, the cam follower will not work in the soil, increasing the resistance of the work [5].

Q is the counterforce generated by the contour wheel at the corresponding ground pressure. The value of Q can be calculated according to the equilibrium conditions of the stable work of the profiling mechanism.

$$(G-Q_i—R_y)Locos\ a= (xer_{ox})\ Lina \tag{1}$$

In the formula Qi—— the positive pressure acting on the profile wheel N

Qi——Rolling resistance Qi=No

F——Rolling resistance coefficient

Rx——Horizontal component of soil resistance

Rx=Rye μ is the coefficient of friction of the soil

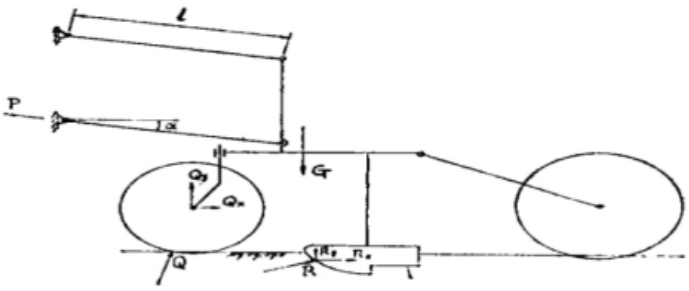

Fig 4. Stressed

Substituting Qi Rx into the above equation is available

$$N=\frac{G-R_y(1+\mu tg\alpha)}{1+ftg\alpha} \tag{2}$$

$$Q=\frac{G-R_y(1+\mu tg\alpha)}{1+ftg\alpha}\sqrt{1+f^2} \tag{3}$$

The size Q of the reaction force is determined by the weight of the body, the soil resistance R and the traction angle [6]. If the weight of the body is constant, the greater the resistance the larger the soil and angle, the smaller the Q value, and the smaller the soil resistance, the smaller the Q value. According to the investigation data, the draft angle a0 of the general seed drill is 0-10 (a0 is the draft angle of normal seeding depth). A2 is 6 - 22 (a2 is the maximum seeder draft angle). A + A is between 20 and 40 (A + A) is the main form of the maximum depth of seeding angle). Analysis of the main parameters of the four link replication mechanism for the main precision seed drill. See the tab 1.

Tab 1. Various machine parameters

model	Pull-up rod	Front and rear levers	Horizontal width	Upper profile corner	Lower profile corner
BZY-6	350	160	200	4	40
2BZ-6	350	160			
North II	500	245	160	-6	37
SydromatII	400	220	125	15	27
Air-suction	500	200	250	12.5	16

3.3 Determine the size of the parallel four-bar linkage

According to the required size, the actual size under the condition of parallel four- dimensional stability, taking into account the terrain and the size of the soil preparation before planting conditions, usually in the size of 8 - 12 cm, the upper profile is also 8 to 12 cm, Formula total copy amount h=L {sin (a0+a1) +sina2}

This parameter is shown in the figure, because the initial draft angle a0 is 0, and the upper and lower profile bars have the same length. You only need to calculate a length [7].

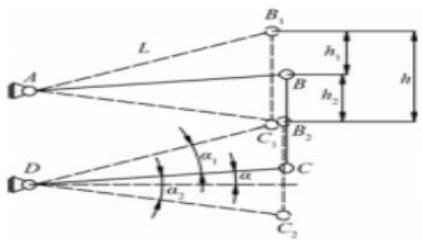

Fig 5. Trussed

$$L=\frac{h_2}{\sin\alpha+\sin(\alpha_2-\alpha_0)} \tag{4}$$

In the formulation h is the maximum amount of profiling (mm) taken from 120mm
A0 is 00for the initial draft angle
A2 for the next profiling angle to take 200
Calculated L = 463.64, take L = 460. Draw on the profiling quantity h
h1=L {sin (a1+a)-sine}
In the formula a1 is the upper profile angle taken 150
After calculating h1 = 119.05, the requirements of the profiling range are satisfied. So take the profiling rod to a length of 460mm

4. CONCLUSION

In this paper, the main introduction is the variation of the traction angle is that the angle of the upper section varies from 6 to 22 degrees, and the lower range is from 20 to 40 degrees. The extremely long four-bar is 460mm, and the width of the copying mechanism is 900mm. The adjustment method uses a spring and a pull rod to adjust, and the specific method is to apply the pressure of the spring to achieve a parallel four-bar pressure.

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