

(19)



LE GOUVERNEMENT  
DU GRAND-DUCHÉ DE LUXEMBOURG  
Ministère de l'Économie

(11)

N° de publication :

LU502561

(12)

**BREVET D'INVENTION****B1**

(21)

N° de dépôt: LU502561

(51)

Int. Cl.:  
A01M 7/00

(22)

Date de dépôt: 25/07/2022

(30)

Priorité:  
01/06/2022 CN 202210619070.X

(43)

Date de mise à disposition du public: 26/01/2023

(47)

Date de délivrance: 26/01/2023

(73)

Titulaire(s):  
CHONGQING VOCATIONAL INSTITUTE OF  
ENGINEERING – 401326 Chongqing,  
Chongqing (Chine)

(72)

Inventeur(s):  
PENG Lan – Chine, FU Shaohua – Chine, FU Xiao –  
Chine, XIANG Li – Chine, WU Xiayi – Chine, WANG Sha  
– Chine

(74)

Mandataire(s):  
Patent42 SA – 4081 Esch-sur-Alzette (Luxembourg)

(54)

**Pesticide spraying vehicle for crops.**

(57)

The invention discloses a pesticide spraying vehicle for crops, which comprises a vehicle frame, a pesticide storage barrel fixed on the vehicle frame, and lateral side arms with internal flow cavities, wherein the flow cavities are communicated with the pesticide storage barrel, two lateral side arms are arranged and respectively installed on the lateral sides of the vehicle frame, and the bottom of the lateral side arms are sequentially provided with a plurality of pesticide spray nozzles at intervals along the length direction; the lateral side arms are in a front-back folding structure and are folded to realize unilateral lateral spraying width adjustment; it can ensure efficient work and improve the spraying accuracy.

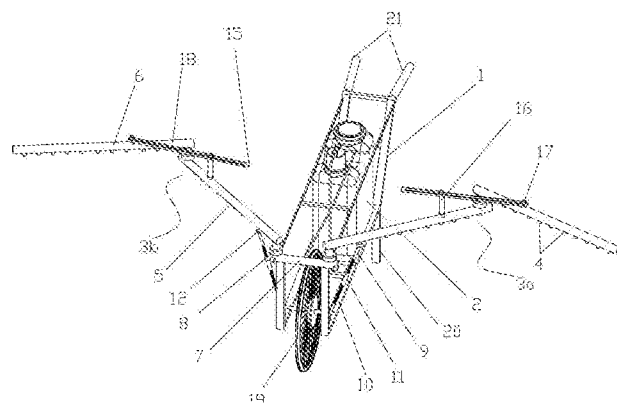


Figure 1

## **DESCRIPTION**

### **Pesticide spraying vehicle for crops**

## **TECHNICAL FIELD**

The invention relates to the field of agricultural machinery, in particular to a pesticide spraying vehicle for crops.

## **BACKGROUND**

Modern agriculture is the unity of healthy agriculture, organic agriculture, green agriculture, circular agriculture, regenerative agriculture and sightseeing agriculture, the unity of rural complex and new urbanization, and the unity of modernization of agriculture, countryside and farmers. Modern agriculture is the foundation of modern industrial system. Developing modern agriculture in developing countries can speed up industrial upgrading, solve employment problems, eradicate poverty, alleviate polarization, promote social equity, eliminate the gap between urban and rural areas, develop domestic markets and form a sustainable economic growth point, which is the only way for developing countries' agricultural development and the main focus of developing countries' catch-up strategy; however, in modern agriculture, the use of pesticides is essential, which plays an important role in preventing, killing or controlling diseases, insects, grasses and other pests that endanger agriculture and forestry, and purposefully regulating, controlling and influencing the metabolism, growth, development and reproduction of plants and pests. In modern agriculture, due to the large planting area and the shortage of human resources, it is an urgent problem in this field to spray pesticides efficiently and accurately. In the prior technologies, unmanned aerial vehicle spraying or manual spraying is used, although the spraying speed of unmanned aerial vehicle is fast, the accuracy is low, which is easy to cause the sidewalk soil between crops to be sprayed, resulting in waste, and at the same time, it is also easy to cause excessive soil pollution, and although the accuracy of manual spraying pesticides through the back box is high, the efficiency is low and it is not suitable for large-scale farming. Therefore, an efficient and accurate pesticide spraying equipment is needed to ensure high efficiency and improve the spraying accuracy.

## SUMMARY

In view of this, the purpose of the invention is to overcome the defects in the prior technologies and provide a pesticide spraying vehicle for crops, which can ensure efficient work and improve spraying accuracy.

The invention relates to a pesticide spraying vehicle for crops, which comprises a vehicle frame, a pesticide storage barrel fixed on the vehicle frame, and lateral side arms with internal flow cavities, wherein the flow cavities are communicated with the pesticide storage barrel; two lateral side arms are arranged and respectively installed on the two lateral sides of the vehicle frame, and the bottom of the lateral side arms are sequentially provided with a plurality of spray nozzles at intervals along the length direction; the lateral side arms are in a front-back folding structure and are folded to realize unilateral lateral spraying width adjustment.

Further, the lateral side arm comprises the first transverse tube and the second transverse tube, wherein the inner end of the first transverse tube is mounted on the vehicle frame and the inner cavity of the first transverse tube is communicated with the pesticide storage barrel; the inner end of the second transverse tube is rotationally communicated with the outer end of the first transverse tube in a way that can swing back and forth; the bottoms of the first transverse tube and the second transverse tube are provided with a plurality of pesticide spray nozzles at intervals in sequence along the length direction.

Further, the front end of the vehicle frame is fixedly provided with a front transverse tube communicated with the pesticide storage barrel, and the inner end of the first transverse tube is communicated and rotationally connected with the front transverse tube through the first rotary joint.

Further, a support rod assembly for adjusting and supporting the rotation angle of the first transverse tube is arranged between the first transverse tube and the vehicle frame.

Further, the support rod assembly comprises an upper support rod, a lower support rod and an adjusting sleeve, wherein the upper end of the upper support rod is hinged to the first transverse tube through an upper ball hinge, the lower end of the lower support rod is hinged to the bottom of the vehicle frame through a lower ball hinge, the lower end of the upper support rod and the upper end of the lower support rod are respectively

screwed into the two ends of the adjusting sleeve, and two internal threads with opposite rotation directions are arranged at the two ends of the inner circle of the adjusting sleeve; the upper support rod and the lower support rod are close to or far away from each other by rotating the adjusting sleeve, thereby realizing the length adjustment of the support rod assembly.

Further, the second transverse tube is connected with the first transverse tube in rotary communication through the second rotary joint.

Further, an adjustable fixed connecting rod for adjusting, supporting and fixing the rotation angle of the second transverse tube is arranged between the first transverse tube and the second transverse tube.

Further, the adjustable fixed connecting rod comprises an elongated connecting rod, the top of the first transverse tube is fixedly provided with the first mounting stud, and the top of the second transverse tube is fixedly provided with the second mounting stud; one end of the connecting rod is rotatably sleeved on the second mounting stud and the connecting rod is locked by a nut from rotating; the middle of the connecting rod is provided with an elongated hole along the length direction; after passing through the elongated hole, the first mounting stud is matched with a nut to lock the connecting rod.

Further, the front of the vehicle frame bottom is provided with a single wheel, the rear of the vehicle frame bottom is provided with two support legs, and the upper part of the vehicle frame rear is provided with two handle bars.

Further, the pesticide storage box is provided with an electric water pump, which is used for pumping the pesticide water in the pesticide storage box to the pesticide spray nozzle, and the handle bar is provided with a control button which is connected with the electric water pump in a controlled way.

The pesticide spraying vehicle for crops disclosed by the invention has the beneficial effects: by arranging the folding lateral side arms for spraying, the lateral spraying width can be adjusted, so that operators can adjust the spraying width of the lateral side arms adaptively according to the planting or growing width of crops in a single row to improve the accuracy of pesticide spraying greatly and avoid the soil pollution by excessive pesticides, and the high spraying efficiency can greatly reduce the labor intensity and improve the planting efficiency.

## BRIEF DESCRIPTION OF THE FIGURES

The invention will be further described with reference to the following drawings and examples:

Figure 1 is a schematic structural diagram of the invention;

Figure 2 is the other structural diagram of the invention;

Figure 3 is another structural diagram of the invention;

Figure 4 is a schematic structural diagram of the lateral side arm of the invention;

Figure 5 is a structural diagram of the lower support rod in the invention.

## DETAILED DESCRIPTION OF THE INVENTION

Figure 1 is a schematic structural diagram of the invention; Figure 2 is the other structural diagram of the invention; Figure 3 is another structural diagram of the invention; Figure 4 is a schematic structural diagram of the lateral side arm of the invention; Figure 5 is a structural schematic diagram of the lower support rod in the invention; as shown in the figures, a pesticide spraying vehicle for crops in this embodiment includes a vehicle frame 1, a pesticide storage barrel 2 fixed on the vehicle frame 1, and a lateral side arm with a flow cavity inside. The vehicle frame 1 is a single-wheel cart frame 1, which is convenient for operators to push between two rows of crops, and the single-wheel structure is conducive to walking on uneven land. The flow cavity is communicated with the pesticide storage barrel 2. Two lateral side arms (including left lateral side arm 3a and right lateral side arm 3b) are arranged and respectively installed on the lateral sides of the vehicle frame 1, and the bottom of the lateral side arms is provided with a plurality of pesticide spray nozzles 4 at intervals along the length direction, wherein the length direction refers to the length direction of the lateral side arms, the front and rear directions of the vehicle frame 1 are longitudinal and the left and right directions of the vehicle frame 1 are transverse. Of course, the pesticide spray nozzle 4 is communicated with the flow cavity and faces downwards, and the left and right lateral side arms are beneficial to spray crops on both sides. A valve can be arranged at the entrance of the flow cavity in the lateral arm, which is convenient for realizing single-sided independent spraying. The lateral arm has a front-back folding structure, and the lateral spraying width can be adjusted by folding the lateral arm. By arranging the folding lateral arm for spraying, the lateral spraying width can be adjusted, which is convenient for operators to adjust the

spraying width of the lateral arm adaptively according to the planting or growing width of crops in a single row to improve the accuracy of pesticide spraying greatly and avoid the soil pollution by excessive pesticides, and the high spraying efficiency can greatly reduce the labor intensity and improve the planting efficiency; the pesticide storage barrel 2 is provided with a pumping mechanism for pumping the pesticide water into the flow cavity, and the pumping mechanism can be an existing electric pumping mechanism or an existing manual pumping mechanism, which belongs to the prior technologies and is not described in detail here.

In this embodiment, the lateral side arm includes the first transverse tube 5 and the second transverse tube 6, the inner end of the first transverse tube 5 is installed on the vehicle frame 1, and the inner cavity of the first transverse tube 5 is communicated with the pesticide storage barrel 2, and the inner side means the side close to the vehicle frame 1 in the lateral direction, otherwise it is the outer side, and the inner side end of the second transverse tube 6 is connected with the outer side end of the first transverse tube 5 in a rotary communication manner in a way that can swing back and forth, and the bottoms of the first transverse tube and the second transverse tube are provided with a plurality of pesticide spray nozzles at intervals in sequence along the length direction; the transverse side arm is prepared by two tubes, which has simple structure and low cost.

In this embodiment, the front end of the vehicle frame 1 is fixedly provided with a front transverse tube 7 communicating with the pesticide storage barrel 2, and the inner side end of the first transverse tube 5 is rotationally connected with the front transverse tube 7 through the first rotary joint 8. Two ends of the front transverse tube 7 are closed, and connecting holes are formed on both sides of the top. The inner cavity of the front transverse tube 7 is communicated with the pesticide storage barrel 2 through a communication tube, and the bottom of the front transverse tube 7 is welded and fixed on the top of the front side of the vehicle frame 1.

In this embodiment, a support rod assembly for adjusting and supporting the rotation angle of the first transverse tube 5 is arranged between the first transverse tube 5 and the vehicle frame 1. The support rod assembly comprises an upper support rod 9, a lower support rod 10 and an adjusting sleeve 11, wherein the upper end of the upper support rod 9 is hinged to the first transverse tube through an upper ball hinge 12, and the lower end of the lower support rod 10 is hinged to the bottom of the frame 1 through a lower

ball hinge 13; the lower end of the upper support rod 9 and the upper end of the lower support rod 10 are respectively screwed into the two ends of the adjusting sleeve 11; two internal threads with opposite rotation directions are arranged at the two ends of the inner circle of the adjusting sleeve 11; the upper support rod and the lower support rod are close to or far away from each other by rotating the adjusting sleeve, thereby realizing the length adjustment of the support rod assembly. As shown in the figure, the support rod assembly exerts an inclined upward supporting force on the first transverse tube to ensure the suspension stability of the transverse side arm; the first transverse tube 5 is arranged in a swinging structure, which is beneficial to adjust the distance between the inner edge of the spraying range and the vehicle frame 1, and can be used for middle sidewalks with different widths, thus increasing the applicability; the adjusting structure of the support rod assembly is simple, easy to adjust and good in support stability.

In this embodiment, the second transverse tube 6 is rotationally connected with the first transverse tube 5 through the second rotary joint 14; the rotary joint is an existing joint, which belongs to the prior technologies and is not described in detail. An adjustable fixed connecting rod for adjusting, supporting and fixing the rotation angle of the second transverse tube 6 is arranged between the first transverse tube 5 and the second transverse tube 6; the adjustable fixed connecting rod comprises an elongated connecting rod 15, the first mounting stud 16 is fixedly arranged at the top of the first transverse tube 5, the second mounting stud 17 is fixedly arranged at the top of the second transverse tube 6, one end of the connecting rod 15 is rotatably sleeved on the second mounting stud 17 and the connecting rod 15 is locked by a nut from rotating, an elongated hole 18 is arranged in the middle of the connecting rod 15 along the length direction, wherein the length direction of the elongated hole is the length direction of the connecting rod 15, and after passing through the elongated hole 18, the first mounting stud 16 is matched with a nut to lock the connecting rod 15. The bottoms of the first mounting stud 16 and the second mounting stud 17 are provided with a limiting platform for supporting the connecting rod 15, and the connecting rod 15 is of a long-sheet metal structure. The connecting rod 15 is used for fixing the first transverse tube 5 and the second transverse tube 6, and is locked and fixed by nuts, so that the structure is simple, the adjustment is convenient, and the stability of the second transverse tube 6 is improved.

In this embodiment, the front of the bottom of the vehicle frame 1 is provided with a single wheel 19, the rear of the bottom of the vehicle frame 1 is provided with two support legs 20, and the upper part of the rear of the vehicle frame 1 is provided with two handle bars 21.

In this embodiment, the pesticide storage box is provided with an electric water pump (not shown), which is used to pump the pesticide water in the pesticide storage box to the pesticide spray nozzle 4, and the handle bar is provided with a control button connected with the electric water pump. Of course, there is also an existing charging power supply, which is convenient for supplying power to the electric water pump. The electric water pump is an prior technology, and is not described in detail here. The electric water pump is used to control the spraying, which makes the operation more convenient and reduces the labor intensity.

Finally, the above embodiments are only used to illustrate the technical scheme of the invention, but not to limit it. Although the invention has been described in detail with reference to the preferred embodiments, those skilled in the art should understand that the technical scheme of the invention can be modified or equivalently replaced without departing from the purpose and scope of the technical scheme of the invention, which should be covered by the claims of the invention.



## CLAIMS

1. A pesticide spraying vehicle for crops, characterized by comprising a vehicle frame, a pesticide storage barrel fixed on the vehicle frame, and lateral side arms with internal flow cavities, wherein the flow cavities are communicated with the pesticide storage barrel, two lateral side arms are respectively installed on the lateral sides of the vehicle frame, and a plurality of pesticide spray nozzles are sequentially arranged at the bottom of the lateral side arms at intervals along the length direction; the lateral side arms are in a front-back folding structure and are folded to realize the unilateral lateral pesticide spraying width adjustment.

2. The pesticide spraying vehicle for crops according to claim 1, characterized in that the lateral side arm comprises the first transverse tube and the second transverse tube, the inner end of the first transverse tube is installed on the vehicle frame and the inner cavity of the first transverse tube is communicated with the pesticide storage barrel, the inner side end of the second transverse tube is rotationally communicated with the outer side end of the first transverse tube in a way that can swing back and forth, and the bottoms of the first transverse tube and the second transverse tube are provided with a plurality of spray nozzles at intervals in sequence along the length direction.

3. The pesticide spraying vehicle for crops according to claim 2, characterized in that the front end of the vehicle frame is fixedly provided with a front transverse tube communicated with the pesticide storage barrel, and the inner side end of the first transverse tube is rotationally connected with the front transverse tube through the first rotary joint.

4. The pesticide spraying vehicle for crops according to claim 3, characterized in that a support rod assembly for adjusting, supporting and fixing the rotation angle of the first transverse tube is arranged between the first transverse tube and the vehicle frame.

5. The pesticide spraying vehicle for crops according to claim 4, characterized in that the support rod assembly comprises an upper support rod, a lower support rod and an adjusting sleeve, wherein the upper end of the upper support rod is hinged to the first transverse tube through an upper ball hinge, the lower end of the lower support rod is hinged to the bottom of the vehicle frame through a lower ball hinge, the lower end of the

upper support rod and the upper end of the lower support rod are respectively screwed into two ends of the adjusting sleeve, and two internal threads with opposite rotation directions are arranged at two ends of the inner circle of the adjusting sleeve, the upper support rod and the lower support rod are close to or far away from each other by rotating the adjusting sleeve, thereby realizing the length adjustment of the support rod assembly.

6. The pesticide spraying vehicle for crops according to claim 2, characterized in that the second transverse tube is rotationally connected with the first transverse tube through the second rotary joint.

7. The pesticide spraying vehicle for crops according to claim 6, characterized in that an adjustable fixed connecting rod for adjusting, supporting and fixing the rotation angle of the second transverse tube is arranged between the first transverse tube and the second transverse tube.

8. The pesticide spraying vehicle for crops according to claim 7, characterized in that the adjustable fixed connecting rod comprises an elongated connecting rod, the top of the first transverse tube is fixedly provided with the first mounting stud, and the top of the second transverse tube is fixedly provided with the second mounting stud, one end of the connecting rod is rotatably sleeved on the second mounting stud and the connecting rod is locked by a nut from rotating, and the middle of the connecting rod is provided with a elongated hole along the length direction; after passing through the elongated hole, the first mounting stud is matched with a nut to lock the connecting rod.

9. The pesticide spraying vehicle for crops according to claim 1, characterized in that a single wheel is arranged at the front of the vehicle frame bottom, two support legs are arranged at the rear of the vehicle frame bottom, and two handle bars are arranged above the rear of the vehicle frame.

10. The pesticide spraying vehicle for crops according to claim 9, characterized in that the pesticide storage box is provided with an electric water pump, which is used to pump the pesticide in the pesticide storage box to the spray nozzle, and the handle bar is provided with a control button which is connected with the electric water pump.

## REVENDEICATIONS

1. Véhicule de pulvérisation de pesticides pour les cultures, caractérisé en ce qu'il comprend un châssis de véhicule, un baril de stockage de pesticides fixé sur le châssis du véhicule, et des bras latéraux avec des cavités d'écoulement internes, dans lequel les cavités d'écoulement sont en communication avec le baril de stockage de pesticides, deux bras latéraux latéraux sont respectivement installés sur les côtés latéraux de le châssis du véhicule et une pluralité de buses de pulvérisation de pesticides sont agencées séquentiellement au bas des bras latéraux à intervalles le long de la direction de la longueur ; les bras latéraux latéraux sont dans une structure de pliage avant-arrière et sont pliés pour réaliser le réglage unilatéral latéral de la largeur de pulvérisation de pesticide.

2. Véhicule de pulvérisation de pesticides pour les cultures, selon la revendication 1, caractérisé en ce que le bras latéral latéral comprend le premier tube transversal et le deuxième tube transversal, l'extrémité interne du premier tube transversal est installée sur le châssis du véhicule et la cavité interne du premier tube transversal est en communication avec le baril de stockage de pesticides, l'extrémité latérale intérieure du second tube transversal est en communication rotative avec l'extrémité latérale extérieure du premier tube transversal d'une manière qui peut osciller d'avant en arrière, et les fonds du premier tube transversal et du second tube transversal sont munis d'une pluralité de buses de pulvérisation à intervalles séquentiels dans le sens de la longueur.

3. Véhicule de pulvérisation de pesticides pour les cultures, selon la revendication 2, caractérisé en ce que l'extrémité avant du châssis du véhicule est munie de manière fixe d'un tube transversal avant communiquant avec le fût de stockage de pesticide, et l'extrémité latérale intérieure du premier tube transversal est reliée en rotation au tube transversal avant par l'intermédiaire du premier joint tournant.

4. Véhicule de pulvérisation de pesticides pour les cultures, selon la revendication 3, caractérisé en ce qu' un ensemble de tiges de support pour ajuster, supporter et fixer l'angle de rotation du premier tube transversal est agencé entre le premier tube transversal et le châssis du véhicule.

5. Véhicule de pulvérisation de pesticides pour les cultures, selon la revendication 4,

caractérisé en ce que l'ensemble de tige de support comprend une tige de support supérieure, une tige de support inférieure et un manchon de réglage, dans lequel l'extrémité supérieure de la tige de support supérieure est articulée au premier tube transversal par l'intermédiaire d'une rotule supérieure, la l'extrémité inférieure de la tige de support inférieure est articulée au bas du châssis du véhicule par l'intermédiaire d'une rotule inférieure, l'extrémité inférieure de la tige de support supérieure et l'extrémité supérieure de la tige de support inférieure sont respectivement vissées dans deux extrémités du manchon de réglage, et deux filetages intérieurs avec des sens de rotation opposés sont disposés aux deux extrémités du cercle intérieur du manchon de réglage ; la tige de support supérieure et la tige de support inférieure sont proches ou éloignées l'une de l'autre en faisant tourner le manchon de réglage, réalisant ainsi le réglage de la longueur de l'ensemble de tige de support.

6. Véhicule de pulvérisation de pesticides pour les cultures, selon la revendication 2, caractérisé en ce que le second tube transversal est lié en rotation au premier tube transversal par l'intermédiaire du second joint tournant.

7. Véhicule de pulvérisation de pesticides pour les cultures, selon la revendication 6, caractérisé en ce qu' une bielle fixe réglable pour régler, supporter et fixer l'angle de rotation du deuxième tube transversal est agencée entre le premier tube transversal et le deuxième tube transversal.

8. Véhicule de pulvérisation de pesticides pour les cultures, selon la revendication 7, caractérisé en ce que la biellette fixe réglable comprend une biellette allongée, le sommet du premier tube transversal est muni fixement du premier téton de montage, et le sommet du deuxième tube transversal est muni fixement du deuxième téton de montage goujon, une extrémité de la bielle est manchonnée de manière rotative sur le second goujon de montage et la bielle est bloquée par un écrou de rotation, et le milieu de la bielle est pourvu d'un trou allongé dans le sens de la longueur ; après avoir traversé le trou oblong, le premier goujon de fixation est assorti d'un écrou pour bloquer la bielle.

9. Véhicule de pulvérisation de pesticides pour les cultures, selon la revendication 1, caractérisé en ce qu' une seule roue est agencée à l'avant du bas du châssis du véhicule, deux pieds de support sont agencés à l'arrière du bas du châssis du véhicule et deux barres de poignée sont agencées au-dessus de l'arrière du châssis du véhicule.

10. Véhicule de pulvérisation de pesticides pour les cultures, selon la revendication LU502561 9, caractérisé en ce que la boîte de stockage de pesticides est équipée d'une pompe à eau électrique, qui est utilisée pour pomper le pesticide dans la boîte de stockage de pesticides vers la buse de pulvérisation, et le guidon est équipé d'un bouton de commande qui est relié avec la pompe à eau électrique.

## FIGURE

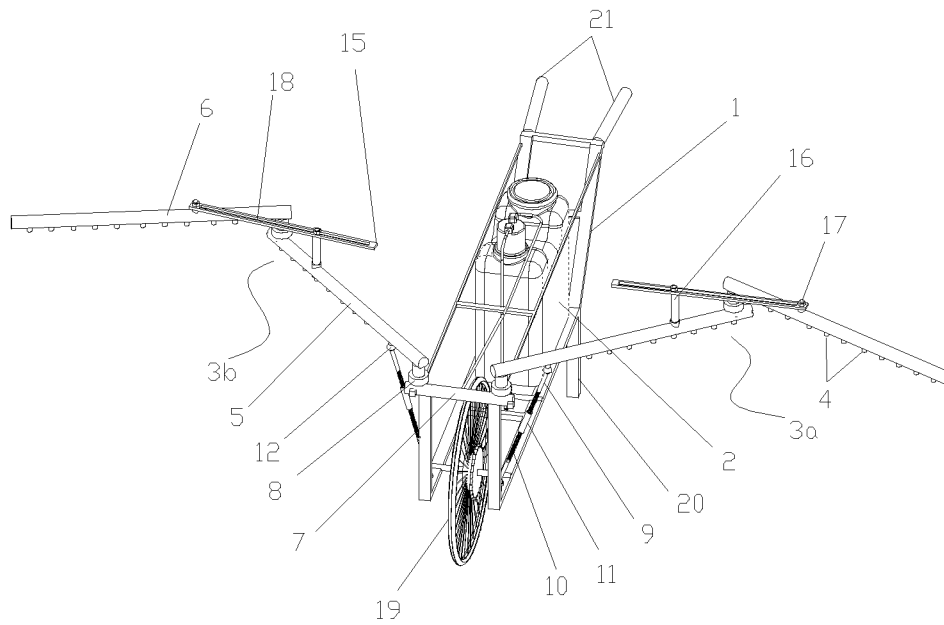


Figure 1

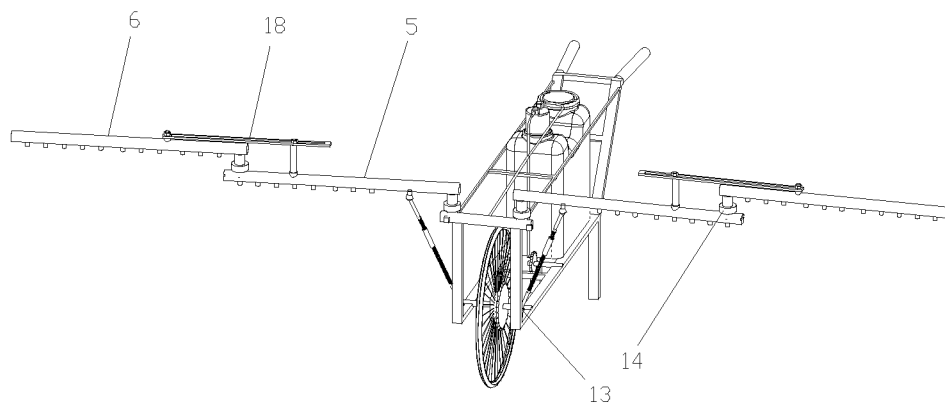


Figure 2

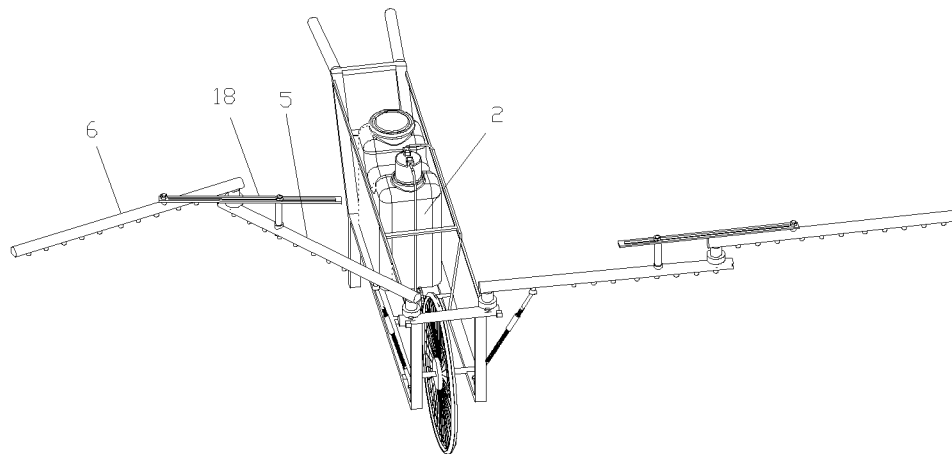


Figure 3

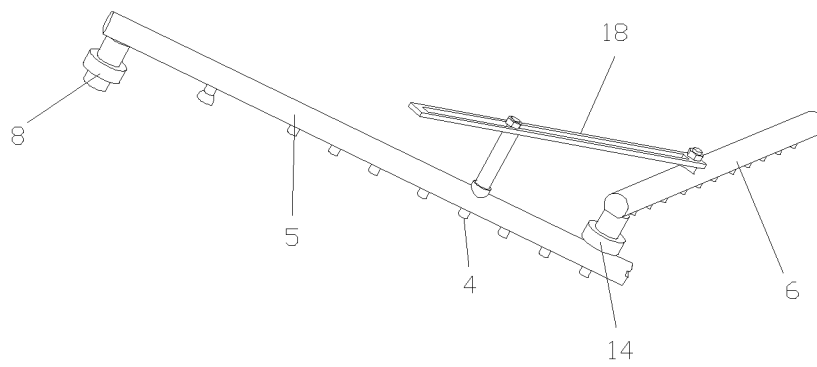


Figure 4

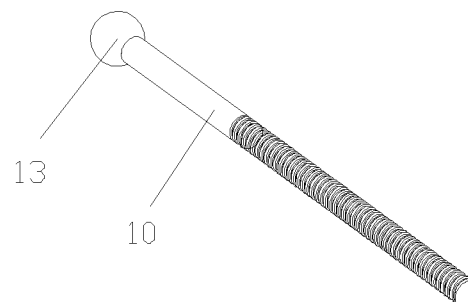


Figure 5