

FIELD CONTROL MACHINE IN THE RECYCLED VINYL RAIL

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ABSTRACT

This study of field control machine in the recycled vinyl rail is gantry crane type and promoting agricultural automatization through self-controlled spraying, harvesting and conveyance. In addition to, that control machine could get a cost and labor reduction effect through automatization and make better environment by preventing farmers from agrichemical damage, accidents and recycling wasted vinyl.

That machine is able to be divided as traveling, spraying, harvesting and conveyance sections. In driving section consists of girder frame, carrier, rail, control system, driving system, working machine, rail and loading device for working machine.

This machine has following advantages to be able to bring a big innovation in the agricultural industry.

- 1) Accurate performance is able to be done by proper positioning due to based on the rails.
- 2) The soil is not made hard like heavy tractor
- 3) The wheel is not sank into the soil and slipped well under rain like heavy tractor. Therefore, weather and soil situation could not affect working condition.
- 4) Complete unmanned control and 24hours-working are available due to traveling on the rails.

5) It could use various energy resources like not only liquid fuel but also solar, common electronic power due to traveling on the rails.

DESIGN AND START

The structure of field control machine is like figure 1 and consists of traveling, agrichemical sprayer, harvesting and conveyance. All devices could be controlled by remote control. The basic configuration is following.

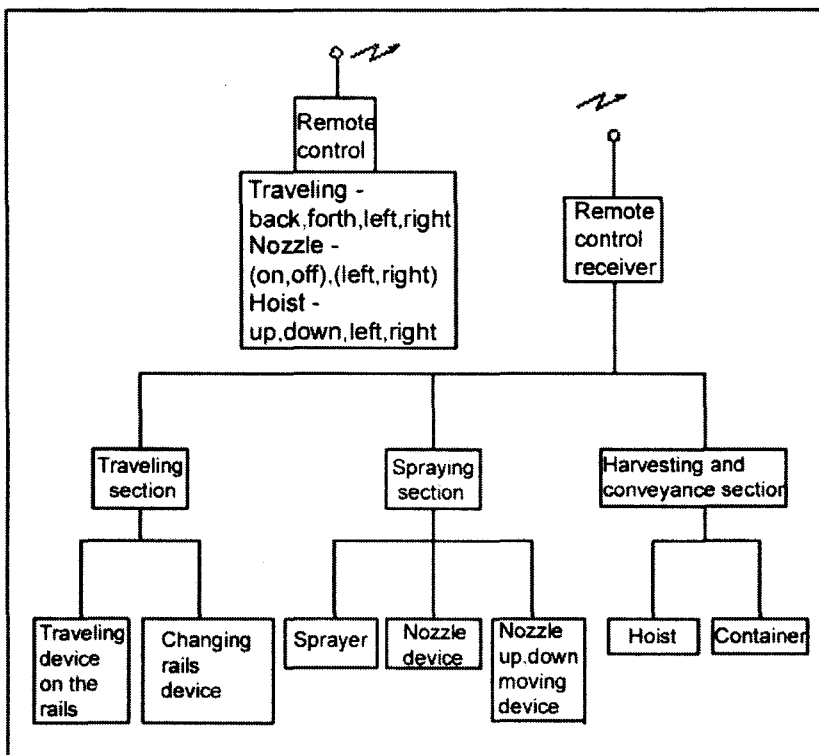


Fig. 1 The configuration of system

1. The frame of control machine

Girder frame is used by L beam - width 20cm, height 40cm, length 16cm – and three dimensional truss structure. Trial structure frames are supporting in both sides of truss. Steel wheels are installed in the lower of trial structure frames to drive on the rails. H beam are mounted under girder frame and carrier are traveling in the H beam as a guide. The detail information of control machine structure lists below.

- a. Girder : 16m x 20cm x 40cm (Length x Width x Height)
- b. Crane : 16m x 3.6m x 1m , I I type (Length x Height x Width)
- c. Crane Driving Motor : 400W, 2 motors are installed in both sides
- d. Rail : 48cm x 30cm x 47cm (Lower x Upper x Height)
- e. Carrier : 1.2m x 1m x 45cm (Length x Width x Height),
Maximum Load : 500kg, Rise and Fall Stroke : 3m
- f. Sprayer : 35PS Diesel Engine, 150A x 2 sets
- g. Nozzle : 4 rows of nozzle bar per gantry
16holes of vertical and 6 holes of horizontal per a row nozzle bar
400W motor for up and down nozzle

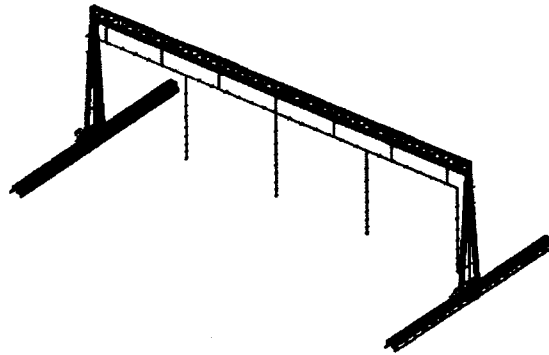


Fig. 2 The frame of field control machine



Fig. 3 The picture of field control machine

2. Transmitting and Receiving remote control

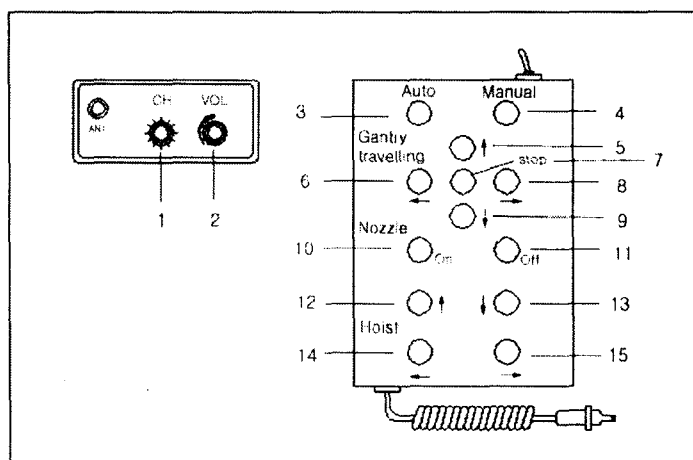


Fig. 4 The structure of remote control

Table 1. The function of Remote Control

Name	Function
1. Channel Control Switch	Tuning frequency of transmitting and receive
2. Volume Control Switch	Tuning sensitivity of transmitting and receive
3. Remote Control button	Remote control is available
4. Manual control button	Manual control is available
5. Gantry forward movement button	Go forth on the rails
6. Gantry left movement button	Go left on the rails
7. Gantry Stop moving button	Stop on the rails
8. Gantry right movement button	Go right on the rails
9. Gantry backward movement button	Go back on the rails
10. Spray On button	Start spraying
11. Spray Off button	Stop spraying
12. Hoist lift Up button	Hoist go up
13. Hoist lift Down button	Hoist go down
14. Hoist lift Left button	Hoist go left
15. Hoist lift Right button	Hoist go right

3. Traveling Section

a) Traveling on the rails : Traveling on the rails by two motors in the lower of trial structure frames and doing various works.

- b) Changing rails device : Changing rails device on the rails - moving to the next rails, driven by rotating right angle in both sides edge.
- c) Traveling rails : Traveling rails are consisted like figure 3. They are rails, rail mounting bolts, upper roller, lower roller, water guide, water hole, upper support, support, and driving motor.

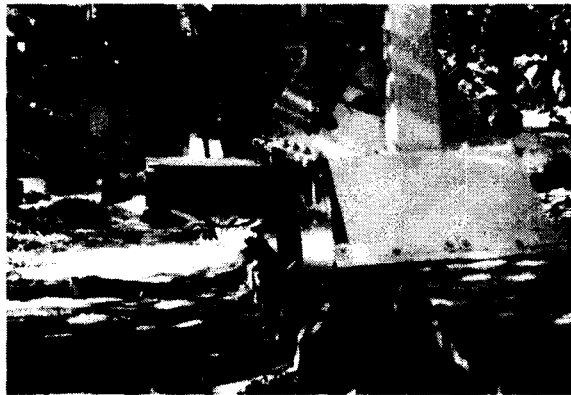
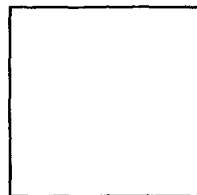
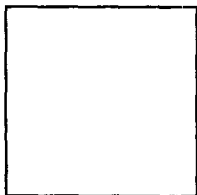


Fig. 5 Traveling device on the rails



Rails, rail mounting bolts, upper roller, lower roller, water guide, water hole, upper support, support, and driving motor

Fig. 6 The section of rail

4. Agrichemical sprayer

- a) sprayer : 35PS, diesel engine, 2 sprayers 150A
- b) Nozzle : 4 rows of nozzle bars per gantry (distance 4m x 4 rows = 16m), 6 holes of vertical, 4 holes of horizontal per nozzle bar.
- c) Nozzle up and down moving device : 4 rows of nozzle are going up and down by a motor. Agrichemical spraying by gantry nozzle device is shown by figure 4.

Spraying is able to be done by remote control easily without 2 or 3 workers. In the field of Korea is not right for using air spraying by helicopters. Therefore, workers are suffering from risk of health and high labor intensity due to using conventional power cultivator or speed sprayer. Gantry machine could solve those problems-make better working condition and reduce work time - and also save cost.

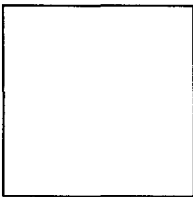


Fig. 7 Sprayer
(nozzle bar and nozzle)

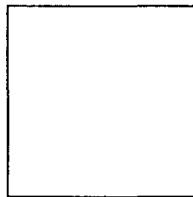


Fig. 8 Conveyance

5. Harvesting and conveyance

- a) Hoist : moving device with up and down, left and right under the gantry frame.
- b) Container : 1.2m x 1m x 45cm (Width x Length x Height), moving up and down, left and right by hoist and gantry.

CONCLUSION

Oversized and heavier agricultural machine is getting harden soil. That could cause more energy spending to cultivate soil and harvesting rate is to be a decrease of 30 to 50%. Wasted vinyl from green house are one of social issues. Even if it is necessary for horticulture, the problem is how to cope with wasted vinyl. If they are left as it is, that could occur serious soil pollution and takes 65 billion won to be buried all. Resource regeneration public corporation is collecting 50% of them and 70% are

recycled. Although corporations are doing their best, it is difficult for them to deal with increasing stock thereby company is being operated at a loss.