

INSERT PLATE FRICTION LEADING-IN MECHANISM

Technical Field

[0001] The present invention relates to the technical field of soft soil foundation construction treatment, in particular to a friction leading-in mechanism for a soft soil construction treatment device.

Background

[0002] For coastal cities or island countries, land resources are scarce, thus land must be reclaimed from the sea to ensure development. When carrying out soft foundation treatment, it is necessary to insert a plastic drainage plate into the soft soil for pile layout.

[0003] An insert plate of an existing plate inserting machine is to be inserted into the soft soil layer of tens of meters deep, which is achieved by forcefully pressing the insert plate into the soft soil layer using a chain or steel wire rope driven by a hydraulic motor. The length of the insert plate must be basically the same as the height of the frame. As a pulling force of 30 tons or more is applied to the chain or steel wire rope when pressing the plate, long and large sized chain or steel wire rope is required, leading to difficulties in installation and maintenance. Moreover, chain and rope breakage, escape of chain from a driving chain wheel, jump of steel wire rope and the like may occur during operation. Therefore, the traditional plate inserting machine requires frequent maintenance and is low in construction efficiency.

Summary

[0004] To solve the above technical problems, the present invention aims to provide an insert plate friction leading-in mechanism which has a reasonable layout and is extremely low in failure rate.

[0005] The technical solution adopted by the present invention is as follows.

[0006] An insert plate friction leading-in mechanism comprises a box and hydraulic motors. The box is provided with pressure springs, friction wheel seats and driving gears, wherein the box is connected with the friction wheel seats through the pressure springs, one or two groups of friction wheels are arranged on the friction wheel seats, the driving gears are driven by the hydraulic motors, and the one or two groups of friction wheels are driven by the driving gears to rotate in the same direction.

[0007] Further, in a preferred embodiment, the hydraulic motor, pressure spring, friction wheel seat, friction wheel and driving gear are oppositely symmetrically arranged on the box.

[0008] Further, in a preferred embodiment, there are provided two or more groups of friction wheel seats symmetrically facing each other, each of the driving gears is provided thereon with a coaxially rotating chain wheel, and two or more chain wheels at the same side are connected in a linkage mode through a chain.

[0009] Further, in a preferred embodiment, there are provided two or more groups of friction wheel seats symmetrically facing each other, and each drive gear is arranged between every two friction wheel gears at the same side.

[0010] Further, in a preferred embodiment, the box is further provided with separation bolts, and the box is connected with the friction wheel seats through the separation bolts.

[0011] Further, in a preferred embodiment, the box is further provided with linkage gears, each friction wheel is provided therein with a friction wheel gear, the linkage gear is driven by the driving gear, and the friction wheel gear is driven by the linkage gear.

[0012] Further, in a preferred embodiment, the box bod is further provided with a guide plate for causing transverse translation of the friction wheel seats.

[0013] Further, in a preferred embodiment, the box bod is further provided with pressure adjustment bolts for adjusting the pressure springs.

[0014] Further, in a preferred embodiment, the box bod is further provided with spring seats in which the pressure springs are mounted.

[0015] Further, in a preferred embodiment, the box is further provided therein with a coupling, the driving gear is provided thereon with a driving shaft, and the hydraulic motor is coaxially connected with the driving shaft of the driving gear through the coupling.

[0016] The present invention has the beneficial effect that the plate inserting machine applying the insert plate friction leading-in mechanism of the present invention has a frame with a height lower than that of the insert plate, so that the weight of the frame is greatly reduced. Thus, only a small sized excavating machine is needed when the plate inserting machine is equipped with one, thereby reducing the cost of the equipment and construction;. With the innovative plate inserting mechanism of the present invention, the technical problems of being difficult in installation and maintenance resulting from the long and large

sized chain or steel wire rope are solved, and the problems of chain and rope breakage, escape of the chain from a driving chain wheel, jump of the steel wire rope and the like of the traditional plate inserting mechanism are thoroughly solved.

Description of the Drawings

[0017] The present invention is described in detail below in combination with the drawings and embodiments.

[0018] Figure 1 is a structural diagram showing an insert plate friction leading-in mechanism of the present invention;

[0019] Figure 2 is an A-A section view of Figure 1;

[0020] Figure 3 is a left section view of Figure 1;

[0021] Figure 4 is a B-B section view of Figure 1; and

[0022] Figure 5 is a C-C section view of Figure 1.

Detailed Description

[0023] Referring to Figures 1-5, an insert plate friction leading-in mechanism comprises a box 1 and hydraulic motors 13. The box 1 is provided with pressure springs 2, friction wheel seats 4 and driving gears 9, wherein the box 1 is connected with the friction wheel seats 4 through the pressure springs 2, one or two groups of friction wheels 7 are mounted on the friction wheel seats 4, the driving gears 9 are driven by the hydraulic motors 13, and the one or two groups of friction wheels 7 are driven by the driving gears 9 to rotate in the same direction.

[0024] Further, in a preferred embodiment, the above-mentioned hydraulic motors 13, pressure springs 2, friction wheel seats 4, friction wheels 7 and driving gears 9 are symmetrically arranged on the box 1 with themselves facing each other.

[0025] Further, in a preferred embodiment, there are provided two or more groups of friction wheel seats 4 symmetrically facing each other, each of the driving gears is provided with a coaxially rotating chain wheel 12, and two or more chain wheels 12 at the same side are connected in a linkage mode through a chain. There are provided two or more groups of friction wheel seats 4 and friction wheels 7 symmetrically facing each other. Each of the two sides is provided with a hydraulic motor 13, one driving gear 9 is driven by one hydraulic motor 13, the coaxially rotating chain wheel 12 is driven by the driving gear 9, and a plurality of chain wheels 12 are simultaneously rotated in the same direction through chain linkage,

thereby driving a plurality of friction wheels at the same side to simultaneously rotate in the same direction. Similarly, the hydraulic motor 13 at the other side drives a plurality of friction wheels at the other side to simultaneously rotate in the same direction, so that the insert plate 11 is inserted into soft soil by two opposite friction pressing wheels.

[0026] Further, in a preferred embodiment, there are provided two or more groups friction wheel seats 4 symmetrically facing each other, and each drive gear is mounted between every two friction wheel gears 71 at the same side. Two or more groups of friction wheel seats 4 and friction wheels 7 are symmetrically arranged facing each other. Each of the two sides is provided with a hydraulic motor 13, one driving gear 9 is driven by one hydraulic motor 13, one friction wheel 7 is driven to rotate by the driving gear 9, and other friction wheels 7 at the same side are driven to simultaneously rotate in the same direction by the rotation of one friction wheel 7 by arranging a drive gear between every two friction wheel gears 71. Similarly, the hydraulic motor at the other side drives a plurality of friction wheels at the other side to simultaneously rotate in the same direction, so that the insert plate 11 is inserted into soft soil by two opposite friction pressing wheels.

[0027] Further, in a preferred embodiment, the box 1 is further provided with separation bolts 8, and the box 1 is connected with the friction wheel seats 4 through the separation bolts 8. When the opposite friction wheels 7 are required to be separated, the separation bolts 8 are tightened, and when the insert plate 11 is required to be tightly pressed in work, the separation bolts 8 are loosened.

[0028] Further, in a preferred embodiment, the box 1 is further provided with linkage gears 10, each friction wheel 7 is provided therein with a friction wheel gear 71, the linkage gear 10 is driven by the driving gear, and the friction wheel gear 71 is driven by the linkage gear 10.

[0029] Further, in a preferred embodiment, the box 1 is further provided with a guide plate 6 for causing transverse translation of the friction wheel seats 4, and the guide plate 6 can cause the friction wheel seat body 4 to move transversely.

[0030] Further, in a preferred embodiment, the box bod 1 is further provided with pressure adjustment bolts 5 for adjusting the pressure springs 2, and the pressure adjustment bolts can adjust the pressure of the pressure springs 2.

[0031] Further, in a preferred embodiment, the box bod 1 is further provided with spring seats 3 in which the pressure springs 2 are installed i.

[0032] Further, in a preferred embodiment, the box bod 1 is further provided with a coupling 14, each driving gear 9 is provided thereon with a driving shaft 15, and the hydraulic motor 13 is coaxially connected with the driving shaft 15 of the driving gear 9 through the coupling 14.

[0033] The structure and working principles are further described in detail as follows: an insert plate friction leading-in mechanism comprises a box 1, wherein a plurality groups of friction wheel seats 4 are mounted in the box, pressure adjustment bolts 5 at the two sides are adjusted simultaneously, the pressure springs 2 are compressed to translate the friction wheel seats 4, to hold tightly the insert plate 11 corresponding to the friction wheels 7 at both sides, the hydraulic motor 13 is driven, the coupling 14 rotates the driving gear 9, the driving gear 9 drives the linkage gear 10, and the linkage gear 10 drives the friction wheel gears 71 in two connected friction wheels 7 so that the friction wheels 7 rotate. As the friction wheels 7 exert corresponding pressure to the insert plate 11 and serve as friction linings, the insert plate is inserted into the soft soil layer by the rotation of the friction wheels 7.

[0034] The friction wheel seats 4 are arranged into several groups as required. The friction wheel 7 is provided a gear linked with the linkage gear 10. The contact surface between the friction wheel 7 and the insert plate 11 is at an angle of "V". There are two linkage schemes, wherein the first scheme is that every two chain wheels of each group are connected by a chain, so that the hydraulic motor 13 can drive a plurality groups of friction wheels 7 at the same side to simultaneously rotate in the same direction; and the second scheme is that each drive gear is arranged between every two friction wheel gears 71 at the same side, so that the hydraulic motor 13 can drive a plurality groups of friction wheels 7 at the same side to simultaneously rotate in the same direction.

[0035] Preferred embodiments of the invention are described in detail above, but the present invention is not limited thereto. Those skilled in the art can make various equivalent modifications or replacements without departing from the spirit of the invention. All such equivalent modifications or replacements should fall within the scope defined by the claims.

What is claimed is:

1. An insert plate friction leading-in mechanism, comprising a box (1) and hydraulic motors (13), wherein pressure springs (2), friction wheel seats (4) and driving gears (9) are mounted in the box (1), the box (1) is connected with the friction wheel seats (4) via the pressure springs (2), one or two groups of friction wheels (7) are mounted on the friction wheel seats (4), the driving gears (9) are driven by the hydraulic motors (13), and the one or two groups of friction wheels (7) are driven by the driving gears (9) to rotate in the same direction.

2. The insert plate friction leading-in mechanism of claim 1, wherein the hydraulic motors (13), the pressure springs (2), the friction wheel seats (4) and driving gears (9) are symmetrically arranged on the box (1) facing each other.

3. The insert plate friction leading-in mechanism of claim 2, wherein two or more groups of the friction wheel seats (4) are arranged symmetrically facing each other, each of the driving gears (9) is provided with a coaxially rotating chain wheel (12), and two or more chain wheels (12) at the same side are connected in a linkage mode through a chain.

4. The insert plate friction leading-in mechanism of claim 2, wherein two or more groups of the friction wheel seats (4) are arranged symmetrically facing each other, and each drive gear is arranged between every two friction wheel gears (71) at the same side.

5. The insert plate friction leading-in mechanism of claim 3 or 4, wherein the box (1) is further provided with separation bolts (8), and the box (1) is connected with the friction wheel seats (4) through the separation bolts (8).

6. The insert plate friction leading-in mechanism of claim 3 or 4, wherein the box (1) is further provided with linkage gears (10), each friction wheel (7) is provided therein with a friction wheel gear (71), each linkage gear (10) is driven by each driving gear (9), and the friction wheel gear (71) is driven by the linkage gear (10).

7. The insert plate friction leading-in mechanism of claim 3 or 4, wherein the box (1) is further provided with a guide plate (6) for causing transverse translation of the friction wheel seats (4).

8. The insert plate friction leading-in mechanism of claim 3 or 4, wherein the box (1) is further provided with pressure adjustment bolts (5) for adjusting the pressure springs (2).

9. The insert plate friction leading-in mechanism of claim 3 or 4, wherein the box (1) is further provided with spring seats (3) in which the pressure springs (2) are mounted.

10 The insert plate friction leading-in mechanism of claim 3 or 4, wherein the box (1) is further provided therein with a coupling (14), each driving gear (9) is provided thereon with a driving shaft (15), and the hydraulic motor (13) is coaxially connected with the driving shaft (15) of the driving gear (9) through the coupling (14).