CONSTRUCTION WASTE RECYCLING AND FORMING DEVICE

Field of the Invention

[0001] The present application relates to the technical field of construction waste treatment, and more specifically to a construction waste recycling and forming device.

Background to the Invention

[0002] In the process of urban construction and development, the generation amount of construction waste has remained high. It mainly includes engineering sediment, waste concrete, waste bricks and stones, decoration waste, demolition waste, engineering mud, etc., and can be subdivided according to the compositions into sediment, concrete blocks, broken stones, brick and tile fragments, waste mortar, mud, asphalt blocks, waste plastics, waste metals, waste bamboo and wood, etc. However, the current treatment manners of construction waste are relatively extensive, and most of them fail to achieve the secondary utilization of resources, which not only causes a waste of resources, but also brings a certain burden to the environment.

[0003] In the prior art, for the crushed construction waste, the small fragments are usually combined and the construction waste is fixed together through cement. However, in actual operation, the formed cement blocks are adhered to the bearing frame and not easy to separate. Meanwhile, it is common to demould and carry the formed cement blocks manually in the construction waste treatment process. However, this not only increases the labor intensity, but also reduces the work efficiency, and there are certain potential safety hazards. These problems make it difficult to improve the utilization rate of construction waste, and the forming effect is not ideal, thereby limiting the wide application of construction waste in the field of recycling.

[0004] Therefore, in view of the existing problems, it is a problem urgently to be solved by a person skilled in the art about how to provide a construction waste recycling and forming device which can ensure that the maintenance, forming and demoulding of cement blocks are integrated, and also the stacking of cement bricks is completed without demoulding and carrying the green bricks, improve work efficiency and simultaneously improve the degree of automation and work efficiency of the entire processing process, thereby realizing efficient recycling and reuse of construction waste.

Statement of Invention

[0005] Therefore, the present application provides a construction waste recycling and forming device, which can ensure that the maintenance, forming and demoulding of cement blocks are integrated, and also the stacking of cement bricks is completed without demoulding and carrying the bricks, improve work efficiency and simultaneously improve the degree of automation and work efficiency of the entire processing process, thereby realizing efficient recycling and reuse of construction waste.

[0006] In order to achieve the above object, the present application adopts the following technical solution.

[0007] A construction waste recycling and forming device includes:

[0008] a box body, where the box body has an upper end opened and a side wall provided with a steam curing component;

[0009] a forming assembly, where the forming assembly includes a driving assembly, a plurality of side plates, a bottom plate and a pressing plate, the mounting end of the driving assembly is fixed to the inner bottom wall of the box body; the plurality of side plates have the top surfaces rotatably connected to the box body, the side walls abutting against each other, and the bottoms connected to the driving assembly; the bottom surface of the bottom plate is fixedly connected to the driving assembly, so that the bottom plate moves up and down along with inward gathering and outward opening of the plurality of side plates; and the pressing plate is vertically located directly above the bottom plate, and can form a forming space with the plurality of side plates and the bottom plate; and

[0010] a grabbing and clamping assembly, where the grabbing and clamping assembly includes a claw grip moving member and a claw grip, the claw grip moving member is located at the upper portion of the box body; the claw grip includes an operating assembly and a plurality of claw sheets, the mounting end of the operating assembly is hinged to the movable end of the claw grip moving member; the plurality of claw sheets are connected to the operating end of the operating assembly, and the plurality of claw sheets are divided into two groups, and correspond to each other in pairs, and the two groups of claw sheets can realize actions of approaching and separating under the control of the operating assembly.

[0011] Through the above technical solution, the present application provides a construction waste recycling and forming device, which realizes the forming treatment of construction waste through the cooperation of the box body, the forming assembly and

the grabbing and clamping assembly, solves the problems existing in current construction waste treatments that the formed cement blocks are adhered to the bearing frame and difficult to separate and the carrying of cement bricks is inconvenient, and improves the utilization rate and forming effect of construction waste.

[0012] Preferably, in the above-mentioned construction waste recycling and forming device, the steam curing component includes an air inlet pipe and electric heating pipes, the side wall of the box body is provided with air ducts communicating with each other, the air ducts are each provided with air vents communicating with the inner cavity of the box body, the air inlet pipe is fixed to the side wall of the box body and communicates with the air ducts; the electric heating pipes are located in the air ducts, and have one ends fixed to the top wall of the box body. The arrangement of the steam curing component can steam-cure the formed construction waste blocks, accelerate their curing speed, improve forming quality, shorten the forming cycle, and improve work efficiency.

[0013] Preferably, in the above-mentioned construction waste recycling and forming device, the driving assembly includes a driving motor, a connecting block and linkage rods, the mounting end of the driving motor is fixed to the inner bottom wall of the box body, and the telescopic rod of the driving motor is fixedly connected to the bottom plate; the connecting block is fixed onto the telescopic rod; the linkage rods are multiple in number, and have one ends hinged to the connecting block, and the other ends rotatably connected to the bottoms of the corresponding side plates. The arrangement of the driving assembly enables the plurality of side plates to be gathered inwards and opened outwards synchronously, and simultaneously the bottom plate to be move up and down accordingly, realizing the variability of the forming space, facilitating the separation of the formed construction waste block from the forming mold, and facilitating the removal of the formed block, thereby improving the flexibility and practicality of the device.

[0014] Preferably, in the above-mentioned construction waste recycling and forming device, the claw grip moving member includes a mounting plate, a rotating motor, a moving block, and a threaded rod, wherein the mounting plate is fixed to the box body; the mounting end of the rotating motor is fixed to the mounting plate; the threaded rod has one end fixed to the rotating end of the rotating motor, and the rod body mounted on the mounting plate; the moving block is threadedly sleeved over the threaded rod, and limitedly slides on the mounting plate; and the claw grip is rotatably connected to the moving block. The arrangement of the claw grip moving member enables the claw grips to move under driving of the moving block, thereby realizing the grabbing and carrying of the formed construction waste blocks, reducing manual operations, reducing labor intensity, and improving work efficiency and safety.

[0015] Preferably, in the above-mentioned construction waste recycling and forming device, the operating assembly includes a fixed plate, a hydraulic cylinder, a fixed block, first push rods, second push rods and third push rods, the fixed plate is fixed on the moving block; the cylinder body of the hydraulic cylinder is fixed on the bottom wall of the fixed plate, and the telescopic rod of the hydraulic cylinder passes through the fixed plate; the fixed block is fixed to the end of the telescopic rod of the hydraulic cylinder; the first push rods are in number of two, and have one ends symmetrically rotatably connected to the top wall of the fixed plate; the second push rod are in number of two, one ends of the two second push rods are respectively rotatably connected to the other ends of the two first push rods, and the other ends of the two second push rods are each fixed with the claw sheets; the third push rod are in number of two, one ends of the two third push rods are respectively rotatably connected to the two sides of the fixed block symmetrically, and the other ends of the two third push rods are respectively rotatably connected to the first push rods symmetrically. The operating assembly realizes the opening and closing actions of the claw sheets through the cooperation of the hydraulic cylinder and multiple push rods, and can effectively grab the formed construction waste block, to avoid the cumbersome and unsafe factors of manual operation, and improve the stability and accuracy of grabbing.

[0016] Preferably, in the above-mentioned construction waste recycling and forming device, a pressing plate guide assembly is further included, the pressing plate guide assembly includes a lead screw transmission member, a guide seat, a guide cylinder, a vertical rod and a connecting rod, the lead screw of the lead screw transmission member is threadedly connected with the guide seat; the lead screw transmission member can drive the guide seat to move in the vertical direction of the lead screw; the guide cylinder is fixed to the guide seat, and the side wall of the guide cylinder is obliquely provided with an arc-shaped guide groove; the vertical rod is coaxially inserted inside the guide cylinder, and has the bottom end fixedly connected to the top of the lead screw, and a guide column slidably connected to the arc-shaped guide groove is fixed on the side wall of the vertical rod, and the connecting rod is arranged parallel to the box body, and has one end fixed to the top end of the vertical rod, and the other end fixed to the pressing plate. The arrangement of the pressing plate guide assembly enables the pressing plate to be kept stable when moving up and down, and through the precise control of the lead screw transmission member, the position of the pressing plate can be accurately adjusted, to apply appropriate pressure to the construction waste to ensure the forming effect and improve the compactness and strength of the formed block. Meanwhile, the pressing plate may be moved away through rotation to provide space for subsequent grabbing and clamping action.

[0017] Preferably, in the above-mentioned construction waste recycling and forming device, a base plate are further included, the box body and the lead screw transmission member are fixed on the bottom plate, the lead screw transmission member further includes a rotating motor and guide rods, the rotating motor is fixed on the base plate, the lead screw has one end connected to the power output shaft of the rotating motor through a coupling, and the other end fixedly connected to the vertical rod; the guide rods are in number of two, the two guide rods have bottom ends both fixed onto the base plate, and arranged on two sides of the lead screw, the guide rods pass through the guide seat which is slidably connected to the guide rods. The arrangement of the base plate and the stable support of the lead screw transmission member provide a solid foundation for the entire device and ensure the operating stability of each component. Meanwhile, the rotating motor can drive the lead screw to rotate, realizing the up-and-down movement of the guide seat and thus adjusting the height of the pressing plate to meet the forming requirements of different heights, thereby enhancing the adaptability of the device.

[0018] It can be seen from the above technical solutions that compared with the prior art, the present application discloses a construction waste recycling and forming device, which has the following beneficial effects.

[0019] 1. The present application realizes the forming treatment of construction waste through the cooperation of the box body, the forming assembly and the grabbing and clamping assembly, solves the problems existing in current construction waste treatments that the formed cement blocks are adhered to the bearing frame and difficult to separate and the small fragments are not uniformly distributed, and improves the utilization rate and forming effect of construction waste.

[0020] 2. The present application can enable the pressing plate to be kept stable when moving up and down through the arrangement of the pressing plate guide assembly, can accurately adjust the position of the pressing plate through the precise control of the lead screw transmission member to apply appropriate pressure to the construction waste to ensure the forming effect and improve the compactness and strength of the formed block, and meanwhile, can provide space for subsequent grabbing and clamping action by moving the pressing plate away through rotation.

Brief Description of the Drawings

[0021] In order to more clearly illustrate the technical solutions in the embodiments of the present application or in the prior art, the drawings required to be used in description of the embodiments or the prior art will be briefly introduced below. Obviously, the

drawings described below are only embodiments of the present application. For the person ordinarily skilled in the art, other drawings may be obtained based on the provided drawings without paying creative work.

[0022] FIG. 1 is a schematic structural view of a construction waste recycling and forming device provided by the present application;

[0023] FIG. 2 is a sectional structural view of the construction waste recycling and forming device provided by the present application; and

[0024] FIG. 3 is an enlarged view of structure A in FIG. 2.

[0025] In the above:

[0026] 1-box body; 11-air duct; 12-air vent; 2-steam curing component; 21-electric heating pipe; 3-forming assembly; 31-driving assembly; 311-driving motor; 312-linkage rod; 32-side plate; 33-bottom plate; 34-pressing plate; 4-claw grip moving member; 41-mounting plate; 42-rotating motor; 43-moving block; 44-threaded rod; 5- claw grip; 51-operating assembly; 511- fixed plate; 512- hydraulic cylinder; 513-fixed block; 514-first push rod; 515-second push rod; 516-third push rod; 52-claw sheet; 6- pressing plate guide assembly; 61-lead screw transmission member; 611-lead screw; 612-rotating motor; 613-guide rod; 62-guide seat; 63-guide cylinder; 63-arc-shaped guide groove; 64-vertical rod; 65-connecting rod; 66-guide column; 7-bottom mounting plate.

Detailed Description

[0027] The technical solutions in the embodiments of the present application will be clearly and completely described below in conjunction with the drawings in the embodiments of the present application. Obviously, the described embodiments are some, but not all of the embodiments of the present application. Based on the embodiments of the present application, all other embodiments obtained by the person ordinarily skilled in the art without creative work fall within the scope of protection of the present application.

[0028] Example:

[0029] Referring to FIGS. 1-3, the embodiment of the present application discloses a construction waste recycling and forming device, including: a box body 1, a forming assembly 3 and a grabbing and clamping assembly.

[0030] The box body 1 has an upper end opened, and a side wall provided with a steam curing component 2.

[0031] The forming assembly 3 includes a driving assembly 31, a plurality of side plates 32, a bottom plate 33 and a pressing plate 34. The mounting end of the driving assembly 31 is fixed to the inner bottom wall of the box body 1. The top surfaces of the plurality of side plates 32 are rotatably connected to the box body 1, the side walls abut against each other, and the bottoms thereof are connected to the driving assembly 31. The bottom surface of the bottom plate 33 is fixedly connected to the driving assembly 31, so as to realize that the bottom plate 33 moves up and down along with inward gathering and outward opening of the plurality of side plates 32; and the pressing plate 34 is vertically located directly above the bottom plate 33, and can form a forming space with the plurality of side plates 32 and the bottom plate 33.

[0032] The grabbing and clamping assembly includes a claw grip moving member 4 and a claw grip 5. The claw grip moving member 4 is located at the upper portion of the box body 1. The claw grip 5 includes an operating assembly 51 and a plurality of claw sheets 52. The mounting end of the operating assembly 51 is hinged to the moving end of the claw grip moving member 4. The plurality of claw sheets 52 are connected to the operating end of the operating assembly 51. The plurality of claw sheets 52 are divided into two groups, and correspond to each other in pairs. The two groups of claw sheets 52 can achieve the actions of approaching and separating under the control of the operating assembly 51.

[0033] In order to further optimize the above technical solution, the steam curing component 2 includes an air inlet pipe and electric heating pipes 21. The side wall of the box body 1 is provided with air ducts 11 communicating with each other. The air ducts 11 are each provided with air vents communicating with the inner cavity of the box body 1. The air inlet pipe is fixed onto the side wall of the box body 1 and communicates with the air ducts 11. The electric heating pipes 21 are located in the air ducts 11, and have one ends fixed on the top wall of the box body 1.

[0034] In order to further optimize the above technical solution, the driving assembly 31 includes a driving motor 311, a connecting block and linkage rods 312. The mounting end of the driving motor 311 is fixed to the inner bottom wall of the box body 1, and the telescopic rod of the driving motor 311 is fixedly connected to the bottom plate 33. The connecting block is fixed on the telescopic rod of the driving motor 311. the linkage rods 312 are multiple in number, and have one ends hinged to the connecting block, and the other ends rotatably connected to the bottoms of corresponding side plates 32.

[0035] In order to further optimize the above technical solution, the claw grip moving member 4 includes a mounting plate 41, a rotating motor 42, a moving block 43 and a

threaded rod 44. The mounting plate 41 is fixed on the box body 1; the mounting end of the rotating motor 42 is fixed on the mounting plate 41; one end of the threaded rod 44 is fixed to the rotating end of the rotating motor 42, and the rod body thereof is installed on the mounting plate 41. The moving block 43 is threadedly sleeved over the threaded rod 44, and limitedly slides on the mounting plate 41. The claw grip 5 is rotatably connected to the moving block 43.

[0036] Further, the mounting plate 41 is provided with a limiting sliding groove in the moving direction of the moving block 43, and the moving block 43 is slidably connected in the limiting sliding groove 411, so as to achieve the limiting of the moving block 43.

[0037] In order to further optimize the above technical solution, the operating assembly 51 includes a fixed plate 511, a hydraulic cylinder 512, a fixed block 513, first push rods 514, second push rods 515 and third push rods 516. The fixed plate 511 is fixed on the moving block 43; the cylinder body of the hydraulic cylinder 512 is fixed to the bottom wall of the fixed plate 511, and the telescopic rod of the hydraulic cylinder 512 passes through the fixed plate 511; the fixed block 513 is fixed to the end of the telescopic rod of the hydraulic cylinder 512; the first push rods 514 are in number of two, and have one ends symmetrically rotatably connected to the top wall of the fixed plate 511; the second push rods 515 are in number of two, one ends of the two second push rods 515 are respectively rotatably connected to the other ends of the two first push rods 514, and the other ends of the two second push rods 515 are fixedly provided with claw sheets 52. The third push rods 516 are in number of two, one ends of the two third push rods 516 are symmetrically rotatably connected to the two sides of the fixed block 513 respectively, and the other ends of the two third push rods 516 are symmetrically rotatably connected to the first push rods 514 respectively.

[0038] In order to further optimize the above technical solution, the pressing plate guide assembly 6 includes a lead screw transmission member 61, a guide seat 62, a guide cylinder 63, a vertical rod 64 and a connecting rod 65. The guide seat 62 is threadedly connected to the lead screw 611 of the lead screw transmission member 61; the lead screw transmission member 61 can drive the guide seat 62 to move in the vertical direction of the lead screw 611; the guide cylinder 63 is fixed on the guide seat 62, and the side wall of the guide cylinder 63 is obliquely provided with an arc-shaped guide groove 631; the vertical rod 64 is coaxially inserted inside the guide cylinder 63, and has the bottom end fixedly connected to the top of the lead screw 611, and a guide column 66 slidably connected to the arc-shaped guide groove 631 is fixed on the side wall of the vertical rod 64, and the connecting rod 65 is arranged parallel to the box body 1, and has one end fixed to the top end of the vertical rod 64, and the other end fixed to the pressing

plate 34.

[0039] In order to further optimize the above technical solution, a bottom mounting plate 7 is further provided. The box body 1 and the lead screw transmission member 61 are fixed onto the bottom mounting plate 7. The lead screw transmission member 61 further includes a rotating motor 612 and guide rods 613. The rotating motor 612 is fixed on the bottom mounting plate 7. The lead screw 611 has one end connected to the power output shaft of the rotating motor 612 through a coupling, and the other end fixedly connected to the vertical rod 64. The guide rods 613 are in number of two. The two guide rods 613 have bottom ends both fixed on the bottom mounting plate 7, and are arranged on two sides of the lead screw 611. The guide rods 613 pass through the guide seat 62 which is slidably connected to the guide rods 613.

[0040] The use method and the working principle of the present application are as follows.

[0041] In the initial state, the driving motor 311 is not started, the four side plates 32 and the bottom plate 33 form a trough which is then filled with stones. After the trough is filled up, the rotating motor 612 is started to rotate the pressing plate 34 to above the box body 1 to form a forming space with the four side plates 32 and the bottom plate 33. After that, the electric heating pipes 21 are turned on, and the air ducts 11 are ventilated through the air inlet pipe to help block forming. After the block forming, the rotating motor 612 is started again to move the pressing plate away, and then the driving motor 311 is started again to realize that the four side plates 32 are opened outwards and simultaneously the bottom plate 33 is also moved upwards, so that the formed block can be pushed out of the box body 1. After that, the rotating motor 42 is started to move the operating assembly 51 left and right, and then the operating assembly 51 controls the claw sheets to realize the approaching action to clamp the formed block, move it out and transport it away.

[0042] In this specification, the embodiments are described in a progressive manner, and each embodiment focuses on the differences from other embodiments. The same or similar parts between the embodiments may be referred to each other. For the device disclosed in the embodiment, since it corresponds to the method disclosed in the embodiment, the description is relatively simple, and the relevant parts may be referred to the method parts.

[0043] The above description of the disclosed embodiments enables one skilled in the art to implement or use the present application. Various modifications to these embodiments will be obvious to one skilled in the art, and the general principles defined

herein may be implemented in other embodiments without departing from the spirit or scope of the present disclosure. Therefore, the present application will not be limited to the embodiments shown herein, but rather will conform to the widest scope consistent with the principles and novel features disclosed herein.