

TITLEMOVING WORK FLOOR PUSH-UP EXPANSION FLOOR DEVICEBACKGROUND OF THE INVENTION1. Field of the Invention

This invention relates to the push-up expansion floor device included in moving work floors that are the scaffolding for high steel frame roof assembly work.

2. The Prior Art

In high steel frame building roof assembly work, when high moving work floors are used, moving the floor involves danger, and the work floor height is restricted. Up till now, to deal with work in high places, scaffolding was further assembled on the work floor and the floor extension front, rear, left, and right had to be minimized to allow work floor movement/ducking under obstructions during indoor work.

Up till now, in roof assembly work (in high places for large-scale buildings), further scaffolding was assembled on scaffolding floors of limited height, which involves danger and bother and does not lead to reduced work time. There were many problem points for safety, efficiency, and cost. For example, the section that extended the scaffolding floor for the work location surface area made it necessary to re-assemble the scaffolding each time.

Brief Summary of the Invention

This invention provides a push-up expansion floor that can expand, extend, and contract into one unit with the moving work floor. The push up expansion floor has considerable height and width and after bringing it close to the surface of the sloped roof assembly bottom side, it can be spread out according to the work location to make it possible to work safely and efficiently.

For the moving work floor self-propelled on parallel rails are installed in the inside span of assembled steel frame posts with drive gyros at the foot bottom. At the four corners of the work floor surface holding frames fasten square shaft support frames and are passed through the floor. Rollers are installed on the inside of the square shaft support frames and pressed through the square shaft support frames and they roll smoothly in contact with the vertical square shafts. At the bottom end of the vertical square shafts, pulleys are set on the shafts. Wire ropes are wound on the winches fastened to the holding frames which are hung on the pulleys. The base ends holding the wire ropes to the holding frames are brought in contact with limit switches wired to a signal lamp via a spring and on the top surface of the top section square shaft support frames. The vertical square shafts are clamped and held with two bolts, the two clamp plates that serve as the stoppers are installed, and the limit switches are brought in contact on the vertical square shafts, so that the winch winding is stopped at the top limit and the bottom limit. The vertical square shaft winches are independently operated by separate remote control

switches.

The top ends of the vertical square shafts are linked to the expansion floor rear surface by pin bearings and support it. It is desirable that on the expansion floor are a push-out floor that is extended by being pushed out by the bottom surface rack meshing with a motor drive pinion installed on the side surface and a spring-up floor that pushes up to the same surface the floor section folded down from the pivot section by the hydraulic cylinder installed on the vertical square shaft. The pinion motor drive and the hydraulic cylinder operation are also operated with remote control switches.

For this invention, in addition to work carried out normally at the height of the moving work floor, for even higher work locations, after obstacles are ducked under with various work tools, the winches for the support frames for the vertical square shafts are operated with the remote control switches on the work floor and when the wire ropes are wound, since the base ends are held in place, as the other ends of the wire ropes are wound around the winches, the wire ropes lift up the pulleys at the bottom ends of the vertical square shafts and the vertical square shafts passing through the vertical square support frames slide along and are guided by the rollers rolling against them and the vertical square shafts are lifted up, pushing up the expansion floor, which is the work floor supported at the top end of those shafts.

In this case, if the four vertical square shafts are pushed up at the same time and brought to the same height, the floor is level, but if the push-up heights of the independently operable vertical square shafts are adjusted, the floor surface can be tilted freely, so the work floor can be tilted to match the gradient of the roof at the work location. When the push-up floor and the spring-up floor are laid out, when the execution surface area extends wider than the work floor surface, either the motor is driven or the hydraulic cylinder operated to expand the left and right push-out floor or spring-up floor from the work floor surface to widen the work floor surface. The square shafts are stopped at the upper limit and lower limit positions by limit switches.

After the push-up by the vertical square shafts reaches the prescribed height, they are clamped by bolting them to two clamp plates at that position to fasten and support them. Then when the wire ropes are loosened, the springs push up the base ends to operate the limit switches and light up the signal lamps, so at that point in time, it is realized that the wire ropes have been released from the tension and the load has been reduced. This aids in extending the wire rope life span.

This invention is for making it easy to move the moving work floors for roof assembly work for large-scale steel frame buildings and at the same time can further push up and expand the work floor surface to match the execution location height, gradient, and

surface area. It adds a push-up expansion floor to a high-location moving work floor self-propelled on parallel rails.

Brief Description of the Drawings

Figure 1 is a side view of the entire invention.

Figure 2 is a diagonal view of the holding frame section of this invention.

Detailed Description

The moving work floor 4 is self-propelled with the drive gyros 3 on its leg bottoms 2 along the parallel rails 1. The floor is installed within the inside spans of steel frame posts, the holding frames 6 fasten the square shaft support frames 5 to the top and bottom of the four corners of the work floor surfaces which are penetrated by shafts and fastened to the shift 8. Rollers 7 are installed on the inner side of the square shaft support frames 5 and they roll so the vertical shafts 8 pass through the square shaft support frames and slide up and down smoothly. Pulleys 9 are installed at the bottom end of each vertical square shaft, and the wire ropes 11 are wound around the winches 10. Winches 10 are fastened and held to the holding frame 6, vertical shafts 8 are hung on pulleys 9 and at the same time two clamp plates 13 clamp and fasten each vertical square shaft 8 with two bolts 12 each to the upper surface of the square shaft support frames to form

stoppers at the necessary positions.

The holding frames 6 fasten the square shaft support frames 5 to the top and bottom of the four corners of the moving work floor 4. The floor is self-propelled with the drive gyros 3 on the leg bottoms 2 on the parallel rails 1. The floor is penetrated and fastened. The vertical square shaft 8 is pushed through the square shaft support frame 5 over rollers 7. The wire ropes 11 of the winches 10 (fastened to the holding frames 6) are hung on the pulleys 9 installed at the bottom ends. Also, the spring-up floor 22 pushes up the fold down floor with the hydraulic cylinder 21 and the push-out floor is pushed out with the rack 19 meshed with the pinion 18. The rack* is laid out on the expansion floor 17 supported with the pin bearings 16 at the top end of the vertical square shafts 8 as shown in Figure 1.

Limit switches 14 for stopping at the upper limit and lower limit positions on the vertical square shaft 8 are actuated to keep the mechanism from going too far up or down. The wire rope base ends 23 are pushed through the holding plates 24 via the springs 25 and the wire rope operating ends 26 are brought in contact with the limit switches 27 lighting up the signal lamps 15. When the wire ropes are tensed by the vertical square shafts rising, the springs 25 are compressed and the operating ends separate. When the vertical square shafts are clamped and held by the clamp plate 13 and the wire ropes are loosened, the operating ends 26 are lifted

by the elasticity of the springs 25 to operate the limit switches 27 and light up the signal lamps 15, giving notice that the wire rope has been relaxed.

The vertical square shaft winches 10 are operated independently by separate remote control switches. The top ends are coupled by the pin bearing 16 to the rear surface of the expansion floor 17 and push up and bear and support the four corners of the floor. In addition to the vertical square shafts 8 at the four corners, others can be installed at locations between the corners as necessary.

On the expansion floor 17 is laid out the push-out floor 20 that is extended by being pushed out by the bottom rack 19 meshing with the drive pinion 18 of the motor installed on the side and the spring-up floor 22 that pushes up to the same surface the floor section bent down from the pivot section by the hydraulic cylinders 21 installed on the vertical square shafts. After the expansion floor push-up, at the execution position, either the pinion motor is driven or the hydraulic cylinder operated by the remote control switch as necessary to extend the push-out floor or the spring-up floor and widen the work floor surface to support work carried out over a wide area. Both sides of the expansion floor can be made push-out floors or both sides can be made spring-up floors. In other words, within the work site complicated by the work tools, with a work floor with as little protrusion as possible, the work

floor is moved left and right and up and down avoiding obstructions and the floor surface after it has come close to the surface to be worked on.

Since the vertical square shafts can each go up and down independently, by changing the height for each set of two shafts, the expansion floor surface slope can be changed. Therefore, the floor surface can be made parallel to the roof surface according to the slope of the front and rear and left and right execution work surfaces. The vertical square shafts are prevented by corresponding limit switches from going too far up or down. With the floor still pushed up, there is still strong tensile force on the wire ropes wound on the winches and they are tensed, but when the vertical square shafts are clamped and held at their work positions and the wire rope is relaxed, the limit switches 27 light up the safety signal lamps 15, so you know that the tension has been released. The wire rope is protected by being freed from the burden of the load and is in a safe state.

With this invention, when the work floor is pushed up for a high roof rear execution surface higher than the self-propelled work floor surface and matched to the slope angle and fastened and when the execution surface is wider than the pushed up work floor surface, the push-out floor and spring-up floor are spread to extend the floor. Therefore even on considerably high locations, with wide work areas, adequate safety can be secured and the work

efficiency can be further increased. During work, the wire rope can be relaxed, which can extend the life span of the wire rope.

In work sites for steel frame roof assembly, this invention pushes out the work floor matching the slope to that of the execution surface at a location even higher than a moving work floor of restricted height to bring that push-out floor close to the work surface to make work safe and efficient. . .

CLAIMS

1. A moving work floor push-up expansion floor device with which on a moving work floor self-propelled on parallel rails with leg-bottom drive gyros, the holding frames putting square shaft support frames above and below the four corners of the floor surface are penetrated and fastened, the vertical square shafts pass through the square shaft support frames rolling on rollers, the wire ropes wound on the winches fastened to the holding frames are counter hung on the pulleys installed at the bottom of those vertical square shafts, the vertical square shafts are moved up and down by this winding, signal lamps are wired that light up when the wire ropes are loosened after the wire rope base ends operate limit switches via springs after the vertical square shafts are fastened and held with a bolt at the prescribed location, and the expansion floor is supported by pin bearings at the top ends of the vertical square shafts.

2. The moving work floor push-up expansion floor device . . .
claim 1 which has on one side the push-up floor that has a rack that slides with the expansion floor drive pinion and has on the other side the spring-up floor that pushes up to the same surface as the floor the floor board folded down with the pivot section with the hydraulic cylinder installed on the vertical square shaft.