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Feasibility Study on Preventing Concrete Expansion Mold

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Abstract

When pouring concrete, the formwork is often fixed to prevent the occurrence of bulging film. This article mainly discusses a formwork support device for preventing concrete expansion. The device mainly uses wooden blocks, L-shaped rods, locking clamps, etc. to reinforce the already supported formwork. The structure is simple and easy to operate, ensuring the structural size of the concrete, improving the surface quality of the concrete, and enhancing the safety of construction. It also reduces the labor intensity of workers and improves the efficiency of formwork support.

Keywords

Concrete; Pouring; Prevent; Supporting Mold; Swollen Film.

1. Introduction

In the early stages of concrete construction, people's understanding of the problem of expansion film is relatively limited. The fixing method of templates is relatively simple, usually using wood or simple support structures. Due to the lack of effective reinforcement measures, the phenomenon of bulging film is prone to occur during the concrete pouring process, which affects the dimensional accuracy and quality of the concrete structure [1].

When using bamboo (wood) plywood or plastic boards as side formwork for cast-in-place concrete walls, columns, and beams, it is usually necessary to set up tension screws, mountain shaped clamps, and wooden beams to ensure the integrity and stability of the side formwork and prevent concrete expansion. Therefore, it is necessary to open tension screw holes on the formwork according to the design or construction plan. Tension screws are disposable and cannot be reused, which increases material costs. Alternatively, steel support systems can be used, which are gradually being applied to further enhance the support capacity of the formwork. The steel support system is usually composed of steel pipes, steel sections, etc., with high strength and stiffness, which can provide strong support for the formwork and effectively prevent membrane expansion. In addition, the steel support system can be reused, improving the utilization rate of materials. But this system is time-consuming and laborious, which delays the progress of the project [3].

2. Formwork System for Preventing Concrete Swelling Film

This article studies the on-site construction situation and proposes a formwork support device to prevent concrete expansion. As shown in Figure 1, this formwork support device for preventing concrete expansion is set on both sides of a corner of the concrete formwork, including a first wooden unit, a first fastening component, a second wooden unit, and a second fastening component. The end of the first wooden unit facing the corner is fixed to the concrete formwork on one side of the corner through a first fastening component, including multiple first wooden units arranged at intervals from top to bottom, and multiple first wooden units arranged horizontally. The first fastening component includes a tension screw, a circular tube, and a mountain shaped clamp. One end of the tension screw passes through the concrete formwork on one side of the corner and extends from the opposite side of the concrete formwork on that corner. The mountain shaped clamp is threaded with the end of the

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tension screw and is fastened to the concrete formwork on one side of the corner through a longitudinally arranged circular tube. The end of the second wooden unit facing the corner is fixed to the template on the other side of the corner through a second fastening component, including multiple second wooden units arranged at intervals from top to bottom, and multiple second wooden units arranged horizontally. The length direction of the first wooden square is perpendicular to that of the second wooden square.

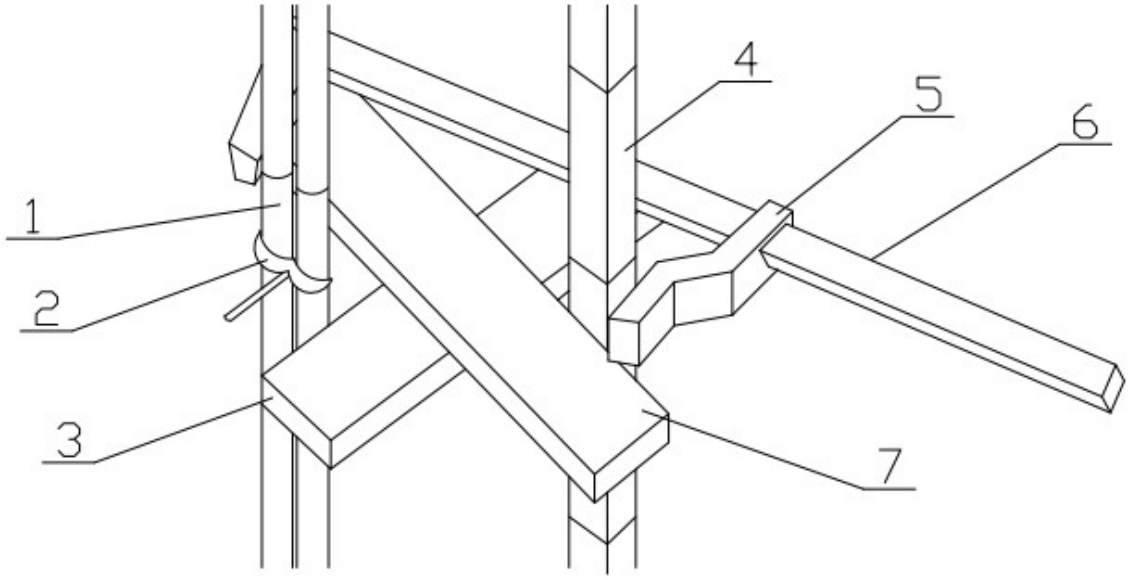

Figure 1. is a schematic diagram of the structure of the formwork support device for preventing concrete expansion

As shown in Figures 1 to 4, the second fastening component includes an L-shaped rod, a locking clip, and a fastening rod. The L-shaped rod is a steel component, with one end hooked onto a circular tube and the other end of the rod extending to the outside of the second wooden square unit. One end of the locking clip has a locking channel that matches the straight part of the L-shaped rod. One end of the locking clip is fitted onto the straight part of the L-shaped rod, and the other end is used to press multiple second wooden blocks onto the concrete formwork on the other side of the corner through a fastening rod.

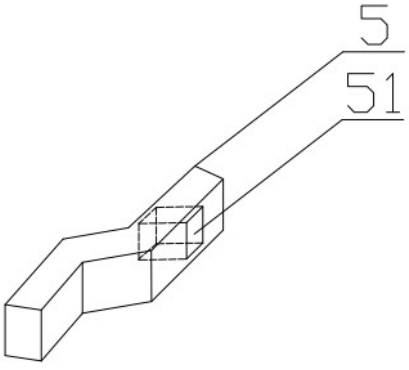

Figure 2. is a schematic diagram of the structure of the locking clip

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The locking channel is in the shape of a straight parallel hexahedron, and the height of the locking channel is slightly greater than the height of the straight rod, allowing the straight rod of the L-shaped rod to slide within the locking channel. The cross-section of the locking channel is diamond shaped, with a width greater than the height of the straight rod and a height less than or equal to the width of the straight rod. The locking clip is S-shaped and has a sleeve rod part, a pressing part, and a connecting part that connects the sleeve rod part and the pressing part. The sleeve rod part and the pressing part are both rectangular in shape, and a locking channel is provided on the sleeve rod part. The pressing part is in contact with the fastening rod, and the contact surface between the sleeve rod and the fastening rod is parallel.

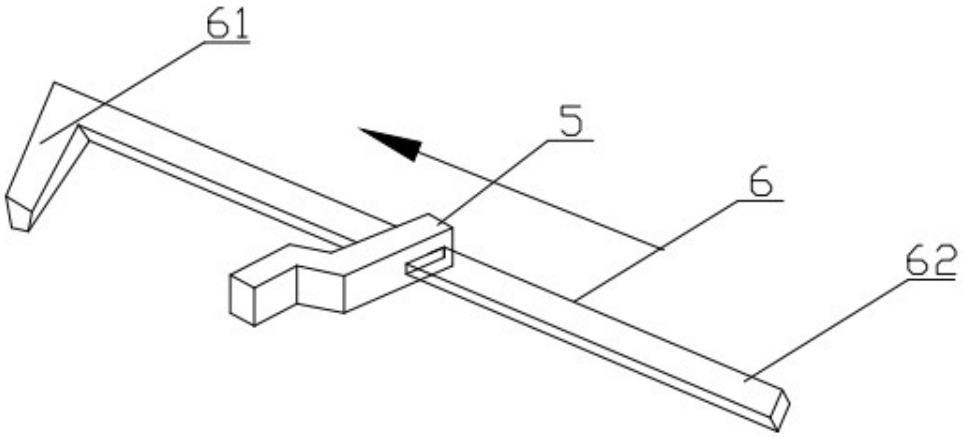

Figure 3. is a schematic diagram of the structure when the locking clip and the L-shaped rod are in a sliding fit state

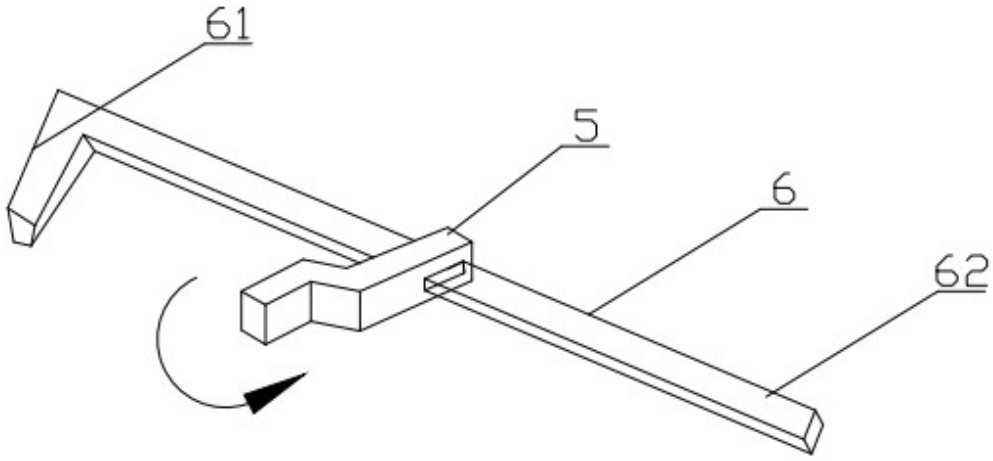

Figure 4. is a schematic diagram of the structure of the locking clip and the L-shaped rod locking In the picture: 1. Round tube, 2. Mountain shaped clamp, 3. Second wooden square, 4. Fastening rod, 5. Locking clamp, 51. Locking channel, 6. L-shaped rod, 61. Hook part, 62. Straight rod part, 7. First wooden square.

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When the length direction of the locking channel is parallel to the length direction of the straight rod portion of the L-shaped rod, the locking clip can move back and forth along the straight rod portion of the L-shaped rod, flip the locking clip outward so that the front and rear walls of the locking channel are respectively in contact with the front and rear walls of the straight rod portion of the L-shaped rod. At this time, the locking clip cannot move along the straight rod portion of the L-shaped rod. The fastening rod is a wooden rod and is set perpendicular to the second wooden square. One side of the fastening rod is in contact with the outer side of multiple second wooden blocks, and the other side is in contact with the clamping part.

The fastening principle of the formwork device used to prevent concrete expansion is as follows: first, fix the first wooden unit through the first fastening component; Then hook the hook of the L-shaped rod onto the circular tube, and extend the straight part of the L-shaped rod to the outside of the second wooden unit to press the fastening rod against the outside of the second wooden unit. Then, place the locking clip on the straight part of the L-shaped rod, and at this time, the length direction of the locking channel is parallel to the length direction of the straight part of the L-shaped rod. Move the locking channel towards the fastening rod and press the clamping part tightly onto the fastening rod. At this time, keep the clamping part pressed onto the fastening rod and continue to move the sleeve towards the second wooden unit until the locking clip is clamped onto the straight part of the L-shaped rod. And when pouring concrete into the formwork, the formwork exerts a pushing force on the second wooden beam, causing the fastening rod to exert an outward pushing force on the locking clip, thereby increasing the clamping force between the locking clip and the L-shaped rod.

3. Conclusion

During the concrete pouring process, the formwork is usually fixed to prevent the occurrence of formwork expansion. This article focuses on a formwork support device used to prevent concrete expansion. The device is mainly composed of wooden blocks, L-shaped rods, and locking clamps, which can reinforce the already supported formwork. Its structure is simple and easy to operate, which not only ensures the structural dimensions of concrete, but also improves the surface quality of concrete. At the same time, it also enhances the safety of construction, reduces the labor intensity of workers, and improves the efficiency of formwork support. And the second fastening component can be reused, saving material costs.

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