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(54) HEAVY WEIGHT TRANSPORTING TRUCK

(71) We, MITSUI SHIPBUILDING AND ENGINEERING CO. LTD., a Corporation organized under Japanese Law, of 6—4, Tsukiji 5-chome, Chuoko, Tokyo, Japan, do

hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to a truck for transporting a heavy weight such as a prefabricated module for use in the construction of ship.

According to the present invention there is provided a truck for transporting heavy loads and including a main hydraulic ram having a member movable relative to, and lengthwise of, the truck, an anchoring hydraulic ram secured to the relatively movable member of the main ram and arranged so that it can cause engagement of an anchoring member with a track transversely relative to the main ram, the two rams being interconnected hydraulically by circuit means such that said main ram can only operate when said anchoring ram receives pressure liquid at more than a predetermined pressure.

A preferred embodiment of the invention will now be described with reference to the accompanying drawings wherein:—

Figure 1 is a plan view showing a truck according to this invention;

Figure 2 is a sectional side view of an oil hydraulic cylinder portion;

Figure 3 is a sectional view taken on line A—A of Figure 2; and

Figure 4 is an oil hydraulic circuit.

Referring to the drawings and more particularly to Figures 1 to 3, a truck 1 has a plurality of wheels 2 and oil hydraulic cylinders 3, 3*a* provided in the longitudinal opposite ends of the truck. The construction of the hydraulic cylinder 3 of one side will now be described, since both cylinders have the same construction. On the outer surfaces of the hydraulic cylinder 3 are secured a pair of horizontal plates 4 which are slidably engaged with guide members each of which has a u-shaped section whereby the hydraulic cylinder is slidably mounted in the truck body. The end of piston rod 6 of the cylinder is fixed to the truck body by a pin 7. A vertical pin 9 is slidably mounted in the projected part 8 on the end of the cylinder 3, and the step plate 10 secured on the top of the pin 9 is connected by connecting plates 11 to a piston rod 13 of a hydraulic cylinder 12 provided in the projected part 8. On the ground, a track is formed by a series of holes 14 provided at regular intervals and into which the pin 9 can be inserted.

In describing the operation of this truck with reference to Figure 4 it will be first assumed that the pin 9 is engaged with the hole 14 as shown in Figure 2. In this state a limit switch LS2 is operated by a cam 15 provided on the cylinder 3 to energise a solenoid SOL2. In Figure 4 pressure oil is introduced in the upper chamber of the cylinder 12 by a pump 16 through directional control valves 17 and 18 so that the pin 9 is lowered to be engaged with a hole 14. When oil pressure in the cylinder 12 is increased higher than a predetermined level pressure oil is introduced into the right hand end of the cylinder 3 through a sequence valve 19 to push the piston rod 6 so that the truck 1 is moved to the left. When limit switch LS1 is operated by the cam 15 at the stroke end of the piston, solenoid SOL1 is energised, whereby pressure oil is introduced in the lower chamber of the cylinder 12 so that the pin 9 is raised to be retracted from the hole 14. When oil pressure in the cylinder 12 is increased to a predetermined level, oil is fed to the left chamber of the cylinder 3 through a sequence valve 20 so that the cylinder 3 is moved to the left. Upon operation of the limit switch LS2 at the stroke end the solenoid SOL2 is energised so that the valve 17 is changed. Thus pressure oil is introduced in the upper chamber of the cylinder 12 whereby the pin 9 is lowered. If the pin 9 contacts with the ground other than the hole 14, the cylinder 3 is moved to the right by the pressure oil introduced in the right chamber thereof without moving the

truck, since the cylinder is not fixed to the ground. When the pin coincides with a hole, it engages with the hole.

The above mentioned operation will be thereafter repeated.

The other hydraulic cylinder 3*a* is operated in the same manner as above described operation. However, the phase of the operation is different from the former by half a period i.e. the two cylinders operate 180° out of phase relative to each other. Thus the truck is continuously moved.

To move the truck to the right the truck is drawn by the piston rod 6. To this end, the pin 9 is inserted into the hole 14 at another time than the above case. More particularly the solenoid SOL4 of the valve 18 is energised so that the valve is changed. Accordingly, when the limit switch LS2 is operated and the solenoid SOL2 is energised, pressure oil is introduced in the lower chamber of the cylinder 12 so that the pin 9 is retracted in contrast to the above operation and oil is introduced in the right chamber of the cylinder 3 whereby the cylinder is slid to the right. When the limit switch LS1 is operated, the pin 9 engages with the hole 14 and oil is fed to the left chamber of the cylinder 3 so that the piston rod 6 is moved to the right. Thus the truck is moved to the right.

From the foregoing it will be understood that the truck in accordance with this invention transports heavy weight without slipping, and operation is safely and reliably performed because moving operation is performed after the cylinder has been fixed to the ground.

WHAT WE CLAIM IS:—

1. A truck for transporting heavy loads and including a main hydraulic ram having a member movable relative to, and lengthwise of, the truck, an anchoring hydraulic ram secured to the relatively movable member of the main ram and arranged so that it can cause engagement of an anchoring member with a track transversely relative to the main ram, the two rams being interconnected hydraulically by circuit means such that said main ram can only operate when said anchoring ram receives pressure liquid at more than a predetermined pressure.

2. A truck according to claim 1 wherein said circuit means includes switching means arranged to carry out cyclically the sequence of operations comprising expansion of the anchoring ram, expansion or contraction of the main ram, contraction of the anchoring ram and contraction or expansion of the main ram.

3. A truck according to claim 2 wherein valve means are provided to enable selection of either expansion or contraction of the main ram following expansion of the anchoring ram.

4. A truck according to any one of the preceding claims wherein the truck is provided with two of said main and anchoring ram arrangements, circuit means being provided for operating the two arrangements 180° out of phase relative to each other.

5. A truck according to any one of the preceding claims and arranged to run on a track providing a series of apertures for engagement by said anchoring member.

6. A truck for transporting heavy loads and substantially as described herein with reference to the accompanying drawing.

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1. A truck for transporting heavy loads and including a main hydraulic ram having a member movable relative to, and lengthwise of, the truck, an anchoring hydraulic ram secured to the relatively movable member of the main ram and arranged so that it can cause engagement of an anchoring member with a track transversely relative to the main ram, the two rams being interconnected hydraulically by circuit means such that said main ram can only operate when said anchoring ram receives pressure liquid at more than a predetermined pressure.

2. A truck according to claim 1 wherein said circuit means includes switching means arranged to carry out cyclically the sequence of operations comprising expansion of the anchoring ram, expansion or contraction of the main ram, contraction of the anchoring ram and contraction or expansion of the main ram.

3. A truck according to claim 2 wherein valve means are provided to enable selection of either expansion or contraction of the main ram following expansion of the anchoring ram.

4. A truck according to any one of the preceding claims wherein the truck is provided with two of said main and anchoring ram arrangements, circuit means being provided for operating the two arrangements 180° out of phase relative to each other.

5. A truck according to any one of the preceding claims and arranged to run on a track providing a series of apertures for engagement by said anchoring member.

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