

WHAT IS CLAIMED IS:

1. A pipe lifting device comprising
 - a support structure (1);
 - a structural fastening assembly (2) assembled to the support structure (1) for
5 fastening to an external pipe supporting structure;
 - at least two power transmission assemblies (3) mounted on the support structure
(1) on opposite sides of each other along the longitudinal direction of the pipe for
transmitting power to move the pipe; and
 - at least two pipe clamping assemblies (4) assembled to each power transmission
10 assembly (3) for clamping the pipe.
2. The pipe lifting device as claimed in claim 1, wherein each pipe clamping assembly (4)
clamps around the pipe.
3. The pipe lifting device as claimed in claim 1, further comprising a stress reducing means
assembled to the pipe clamping assembly (4) for reducing the pipe's stress as the pipe
15 lifted.
4. The pipe lifting device as claimed in claim 3, wherein the stress reducing means is a
beam (B) which is assembled to each pipe clamping assembly (4) and is laid along the
longitudinal direction of the pipe.
5. The pipe lifting device as claimed in claim 4, wherein the beam (B) is made of aluminum,
20 carbon steel, metal alloy or angle steel bar.
6. The pipe lifting device as claimed in claim 4 or 5, wherein the beam (B) is straight or
curved.
7. The pipe lifting device as claimed in any one of claims 4-6, wherein the beam (B) has a
straight middle section and tilted downward ends.
8. The pipe lifting device as claimed in claim 3, wherein the stress reducing means is at
25 least one magnet (M) assembled to the pipe lifting device in a way that the magnet (M)
attracts to an external surface of the pipe as the pipe lifted.
9. The pipe lifting device as claimed in claim 8, wherein the magnet (M) is assembled to
each pipe clamping assembly (4).

10. The pipe lifting device as claimed in claim 8 or 9, wherein the stress reducing means is at least one magnet (M) assembled to an inner wall of each pipe clamping assembly (4) in a way that the magnetic (M) attracts to the external surface at an upper part or a lower part of the pipe as the pipe lifted.
- 5 11. The pipe lifting device as claimed in claim 8 or 9, wherein the stress reducing means is at least two magnets (M) assembled to an inner wall of each pipe clamping assembly (4) in a way that the magnetic (M) attracts to the external surface at an upper part and a lower part of the pipe as the pipe lifted.
- 10 12. The pipe lifting device as claimed in claim 8 or 9, wherein the stress reducing means is at least four magnets (M) assembled to an inner wall of each pipe clamping assembly (4) in a way that the magnetic (M) attracts to the external surface at an upper left part, an upper right part, a lower left part and a lower right part of the pipe as the pipe lifted.
13. The pipe lifting device as claimed in any one of claims 8 - 12, wherein the magnet (M) has a surface corresponding to the pipe's curvature.
- 15 14. The pipe lifting device as claimed in any one of claims 8 - 13, wherein the magnet (M) has a pull strength at 50-500 kg, preferably 80-350 kg, and more preferably 100-300 kg.
15. The pipe lifting device as claimed in claim 1 or 2, wherein the pipe clamping assembly (4) is placed 30-120 cm away from each other along the longitudinal direction of the pipe.
- 20 16. The pipe lifting device as claimed in claim 15, wherein the pipe clamping assembly (4) is placed 50- 90 cm, more preferably 70- 85 cm away from each other along the longitudinal direction of the pipe.
17. The pipe lifting device as claimed in any one of claims 1, 2, 15, 16, wherein the pipe clamping assembly (4) comprises a lower pipe clamping assembly (4.1) mounted to the power transmission assembly (3) and an upper pipe clamping assembly (4.2) detachably assembled to the lower pipe clamping assembly (4.1).
- 25 18. The pipe lifting device as claimed in claim 17, wherein the upper pipe clamping assembly (4.2) is detachably assembled to the lower pipe clamping assembly (4.1) by means of screw or magnet.
- 30 19. The pipe lifting device as claimed in claim 17 or 18, wherein the lower pipe clamping assembly (4.1) comprises an inner wall (4.1.1) that supports a lower part of the pipe, a

flat lower wall (4.1.2), and two side walls (4.1.3) that protrude upwardly in an inclined manner from the lower wall (4.1.2).

20. The pipe lifting device as claimed in claim 19, wherein the side wall (4.1.3) is inclined to the lower wall (4.1.2) at an angle of 40-70 degrees, preferably 60-70 degrees.

5 21. The pipe lifting device as claimed in claim 17 or 18, wherein the upper pipe clamping assembly (4.2) comprises an inner wall (4.2.1) that supports an upper part of the pipe, a flat upper wall (4.2.2), and two side walls (4.2.3) that protrude downwardly in an inclined manner from the upper wall (4.2.2).

10 22. The pipe lifting device as claimed in claim 21, wherein the side wall (4.2.3) is inclined to the upper wall (4.2.2) at an angle of 40-70 degrees, preferably 60-70 degrees.

23. The pipe lifting device as claimed in any one of claims 17-22, wherein the lower pipe clamping assembly (4.1) and the upper pipe clamping assembly (4.2) have a thickness in a range of 5-7 cm.

15 24. The pipe lifting device as claimed in any one of claims 17-23, wherein the lower pipe clamping assembly (4.1) and the upper pipe clamping assembly (4.2) are made of aluminum or carbon steel.

20 25. The pipe lifting device as claimed in any one of claims 17-24, wherein the upper pipe clamping assembly (4.2) further comprises at least one hole (4.2.4) arranged at an upper part of the upper wall (4.2.2) for inserting a latch through the upper pipe clamping assembly (4.2) and rests against the pipe's surface.

26. The pipe lifting device as claimed in claim 1, wherein the supporting structure (1) is a rectangular or oval or circular shape along the longitudinal direction of the pipe comprising a plurality of holes (1.1) arranged at the side wall for assembling the structural fastening assembly (2) to said hole (1.1).

25 27. The pipe lifting device as claimed in claim 1, wherein the supporting structure (1) is at least two vertical plates (1a,1b) arranged away from each other along the longitudinal direction of the pipe.

30 28. The pipe lifting device as claimed in claim 1, wherein the structural fastening assembly (2) comprises a pivot (2.1) arranged transversely in a middle of each side wall of the supporting structure (1), at least two holding hooks (2.2) rotatably connected to the pivot (2.1) opposing each other for mounting to the external pipe supporting structure, and a

lock mechanism (2.3) provided at each holding hook (2.2) for restricting a movement of the holding hook (2.2).

29. The pipe lifting device as claimed in claim 28, wherein the structural fastening assembly (2) is fastened to the external pipe supporting structure by rotating around the supporting structure (1) or longitudinally sliding along the supporting structure (1).
30. The pipe lifting device as claimed in claim 28, wherein the holding hook (2.2) comprises a bar (2.2.1) having curve shape where one end of the bar (2.2.1) is rotatably connected to the pivot (2.1) and a mounting plate (2.2.2) provided at the other end of the bar (2.2.1).
31. The pipe lifting device as claimed in claim 28, wherein the lock mechanism (2.3) comprises an insert hole (2.3.1) provided on each holding hook (2.2), a mounting bolt (2.3.2) for fastening the support structure (1) and the insert hole (2.3.1) for restricting a movement of the holding hook (2.2).
32. The pipe lifting device as claimed in claim 1, wherein the structural fastening assembly (2) comprises a plurality of angle members (2.4) where one end of each member is mounted to the supporting structure (1) and where a pair of angle members (2.4) is assembled into an invert U-like shape structure to cover the external pipe supporting structure.
33. The pipe lifting device as claimed in claim 32, wherein the structural fastening assembly (2) comprises two pairs of angle members (2.4) where each pair is assembled into an invert U-like shape structure to cover the external pipe supporting structure, spaced apart along the longitudinal direction of the external pipe supporting structure.
34. The pipe lifting device as claimed in claim 32 or 33, wherein the structural fastening assembly (2) further comprises a connecting member (2.5) assembled to the other end of each pair of the angle members (2.4) assembled into the invert U-like shape structure for connecting the angle members (2.4) together in such a way that a width of the invert U-like shape structure is adjustable along with the width of the external pipe supporting structure.
35. The pipe lifting device as claimed in claim 1, wherein the power transmission assembly (3) is selected from jack, electric jack, hydraulic jack, gear system, and electric motor.

36. The pipe lifting device as claimed in any one of claims 1-35, further comprising a control unit connected to the power transmission assembly (3) for controlling a movement of the power transmission assembly (3).
- 5 37. The pipe lifting device as claimed in any one of claims 1-36, further comprising at least one auxiliary device selected from stress gauge, pipe thickness gauge, distance measuring device, and automatic alert device.
38. A use of the pipe lifting device as claimed in any one of claims 1-37 for pipe lifting.
39. The use of the pipe lifting device as claimed in claim 38, wherein the pipe lifting is performed at a vertical or horizontal distance up to 15 cm, preferably up to 10 cm.
- 10 40. The use of the pipe lifting device as claimed in claim 38 or 39, wherein the pipe lifting is performed by moving the pipe at a distance of 0.1-15 cm, preferably 0.3-0.8 cm each time.
- 15 41. The use of the pipe lifting device as claimed in any one of claims 38-40, wherein the pipe lifting is performed in conjunction with at least one auxiliary device selected from stress gauge, pipe thickness gauge, distance measuring device, and automatic alert device.