the structures of the hammer with a suitably flexible fastening. In known solutions, the driving cylinder is fastened, for example, from its piston-side end (upper end) with an articulation and from its piston rod side end (lower end) with a flexible fastening. Another alternative has been to fasten the driving cylinder to the hammer with an articulation from a fastening point at its centre, the aim being to locate the fastening point as close to the centre of gravity of the driving cylinder as possible. Usually, the moving end of the driving cylinder is fastened to the ram block in an articulated manner with a shackle.

In currently known driving cylinders, the solenoid valve of the driving cylinder is usually located outside the cylinder liners of the heads of the driving cylinder. The disadvantage of these currently known driving cylinder solutions is that the implementation of the solenoid valve closing and opening the pressure medium ducts between the cylinder chambers and leading away from the chambers is complex, requires a considerable number of gaskets due to the several joints and is, therefore, laborious to service and repair.

Patent publication US 5,806,610 discloses a known apparatus for generating impacts for a pile driving rig. The apparatus has a hydraulic cylinder with reciprocating piston located within the hydraulic cylinder.

Brief summary of the invention

The aim of the invention is to introduce a new type of driving cylinder for a pile driving rig, which is structurally simpler than before, more durable, and has a solenoid valve which requires less maintenance and repair than before. A further aim of the invention is to introduce a pile driving rig equipped with a driving cylinder according to the invention.

The aim of the invention is achieved with a driving cylinder, wherein the solenoid valve guiding pressure medium into the cylinder part is a slide valve, which is located at least partly inside at the piston-side head of the driving cylinder, and the slide valve stem of which is at least partly outside the inner cylinder liner in the direction of movement of the piston part, in which case the solenoid valve may be implemented in a simpler way and, for example, with a smaller amount of gaskets between the different parts of the solenoid valve and of the driving cylinder and external flow ducts of the slide valve. More specifically, the driving cylinder of a pile driving rig according to the invention is characterized by what is described in independent claim 1, and

the pile driving rig is characterized by what is described in dependent claim 12. Dependent claims 2 to 11 describe preferred embodiments of the driving cylinder of a pile driving rig according to the invention, and dependent claims 13 to 21 describe preferred embodiments of the pile driving rig according to the invention.

The advantage of the driving cylinder of the pile driving rig according to the invention is that the solenoid valve can be made simpler, more durable and more reliable than before. Due to this, the number of separate parts requiring tightness and precise dimensioning, such as hoses and valves outside the driving cylinder, decreases and thus the driving cylinder and a pile driving rig equipped with such driving cylinder, are simplified and more economical in terms of manufacturing costs. This type of driving cylinder also has the following advantages:

- The slide valve may be implemented in such a way that the pressure of the pressure medium, which affects the slide valve stem, is always equal on both sides of the stem, whereupon the slide valve stem of a pressurized driving cylinder is always in force balance. On account of this, the volume flow requirement of control is lower, which means that the control ducts of the slide valve may be smaller, thus rendering the overall external dimensions of the driving cylinder smaller and the driving cylinder itself lighter.
- Structures subject to the pressure of the pressure medium have no welded joints, which results in better fatigue durability and easier manufacture.
- Conveying the pressure medium from the well utilised pressure accumulators mounted in conjunction with the driving cylinder may be done along the shortest route to the piston rod side head. This gives good operating efficiency with low vibrations in the pressure line.
- The pressure medium may be conveyed away from the driving cylinder along a short route by utilising the damping of the pressure accumulators. This improves operating efficiency, decreasing the strength of oscillations in the return line.
- In the driving cylinder is achieved an even load distribution throughout, because the flow of pressure medium can be made to affect both the solenoid valve of the driving cylinder and also its cylinder and piston parts symmetrically.