German utility model no. DE202021102283U1

Pipelines Installed in the Shortest Time with Additional Transport Capabilities Using Production and Laying Vehicles or Transporting Supports

Description

Pipelines have existed since antiquity and were even made of wood. The Romans perfected pipeline construction for their time. Moreover, pipelines existed in the Alpine region as early as the 17th century. However, the completion of a pipeline still takes a long time today. Additionally, good infrastructure is necessary (at least in the form of a road along the line and a corresponding fleet of machinery). In contrast, the delivery of, for example, chemicals or individual pipes to a specific location (central warehouse) is possible without major problems. Thus, warehouses on a coast, near a river, near a port, or inland storage areas along a road are easily accessible using the existing infrastructure. The problem lies in quickly laying pipelines in areas without a well-developed road network.

There are many solutions for installing pipelines, such as:
- CN000101598245A, on-site production of plastic pipes of any length in a trench,
- CN000103791156A, rapid installation of large plastic pipes,
- CN000111573438A, automatic plastic hose laying machine,
- CN000202091633U, plastic pipeline fixed with metal at the bottom,
- US020210071781A1, individual pipes laid by machines in various terrains,
- US000006450736B1, high supports, e.g., for tundra.

My invention is based on further developing the manufacture and installation of pipelines to obtain affordable and widely available pipelines.

The existing solutions fulfill their respective functions according to the circumstances but do not have the possibilities of the above-mentioned invention.
A solution for rapidly laying pipelines is desired, and the invention specified in claim 1 of pipelines installed in the shortest time with additional transport capabilities using production and laying vehicles or transporting supports meets these requirements.

First Embodiment:

The laying of the pipeline is carried out by a tracked vehicle/crawler (pipeline laying vehicle/pipeline laying machine, see Fig. 1–1) that, on the one hand, manufactures/synthesizes the pipeline (according to claim 2) (e.g., curing of chemicals in a ring hardener/ring reaction tube, Fig. 1–2 with buffer tanks 5), depending on the type of reaction with or without ring-shaped UV light, possibly in combination with other materials) and, on the other hand, digs trenches simultaneously, if necessary. Plastics often used are polyethylene, polypropylene, and polyvinyl chloride, which is harmful to the environment. If the machinery and equipment do not all fit on one vehicle (as with a tunnel boring machine that immediately performs the support and tunnel lining after drilling), at least a second vehicle may be needed, which is connected to the first vehicle. As shown in claim 3, the curing pipeline must be guided over several meters until the plastic is fully cured, depending on the chemical reaction, and exits at the end of the tracked vehicle (Fig. 1–3). For materials that take a few minutes to cure (e.g., flash cement), the reaction tube must be longer. The pipeline is laid directly into the existing trench (according to claim 4). As shown in claim 5, Fig. 2 shows only a few of the many possible additional applications of the pipeline 1 (various “rails” 2, additional small pipes—inside or outside 3 and 8, a pipe division 4, a gear base 5, non-circular external supports—also serving as channels 8, multiple chambers 9, guides 6 and 7, etc.). A frame extends into the freshly created pipeline section (according to claim 6) or up to the “rails” on the pipeline to receive the materials transported from the central warehouse and deliver them for processing. If transport aids are used in the pipeline (such as containers), these can, as shown in claim 7, be returned to the central warehouse via the frame, for example, in the second half of the pipeline or on the pipeline itself (see Fig. 2–4). The pipeline can be additionally secured, if necessary, with metal rods shot or screwed into the ground (as with an earth drill) or “injected” anchors (Fig. 3–4, according to claim 8) made of the same plastic (e.g., via tubes that are withdrawn after curing). As shown in claim 9, an above-ground pipeline can also be supported by pipes or triangular channels attached to the base (see Fig. 2–8). On the way back, the tracked vehicle can complete many residual tasks or carry out necessary installations (according to claim 10): filling trenches, creating branches and tapping points, considering compensators for expansion due to heat, valves, shut-off valves, gate valves, taps, pumps, measuring devices, control elements, heat and cold insulation (use of expansion pieces/compensators), etc.

Thus, it is possible to lay a pipeline over long distances where there are no roads and no other infrastructure. Pipelines with very large diameters (more than 2 meters) are thus feasible! As shown in claim 11, huge pipes are conceivable, e.g., for fresh water from seawater desalination plants or for returning river water to dry areas after filtering shortly before a river delta. Branches and tapping points are also possible (according to claim 12). Thus, the irrigation of dry areas and deserts is also conceivable. As shown in claim 13, the rapidly laid pipeline should, if necessary, consist of extra pipes for materials or cables made of the same material (quick-curing, environmentally friendly, easily recyclable plastic, steel, or flash cement/cement/concrete, etc.). The pipeline can run above ground, partially in a trench, when crossing roads and other obstacles, or entirely underground. If necessary, the pipeline can be equipped with supports (according to claim 14), which can also be transported through or on the pipe in individual parts. As shown in claim 15, the pipeline can consist of or be made of multiple layers (plastic, metal, fabric, etc.). This serves, for example, stability, insulation, durability, etc., and should be adapted to the environmental factors.

If a central power supply is not available, solar cells (photovoltaics) can generate power on the pipelines and, if mostly above ground, on the pipelines for pumps (according to claim 16). As shown in claim 17, material transport can be carried out in various ways inside the pipeline or on the outside of the pipeline. In extra pipes or channels (see Fig. 2, 3, and 9), all necessary materials can be transported: e.g., chemicals, steel in balls or powder, fuel, plastic, hardeners, water, food, etc. Transporting the chemicals/materials/goods is also possible with compressed air as a kind of “pneumatic tube” (according to claim 18). Thus, back-and-forth material transport in pipelines is also conceivable in small containers ("packages") (driven by a motor or with an external drive like the aforementioned “pneumatic tube”).

As shown in claim 19, “rails” synthesized or installed in, on, or on the pipeline (also combinations) are possible if needed so that without roads for construction and subsequently goods, pipes, cables, possibly even people can be transported on light vehicles, etc. If the focus is on transport and less on fluid transmission, two (or more) smaller pipelines with thicker walls can be created from the outset, serving as a kind of “rail” (according to claim 20).

If such a pipeline is only a temporary measure, as shown in claim 21, a quick dismantling can take place from the end of the pipeline, and the crushed parts are transported back through the (still) existing pipeline for complete recycling.

The Second Embodiment Includes

1. (According to claim 22) At the beginning of the pipeline, i.e., in the central warehouse, pipes already welded together or, if there are weighty reasons against it,
2. Individual pipes (Fig. 3–3, depending on requirements, different steels or other materials are suitable). As shown in claim 23, a special transport support (see Fig. 3–1) is temporarily mounted on each pipe or, for pipes with a large diameter, transported as individual parts or completely in the pipeline and, for example, set down and installed by a tracked vehicle. These supports transport (according to claim 24) the steel, plastic, concrete, or other pipes to the next support. It may be useful, as shown in claim 25, to have a guide on the underside of the pipes if necessary (Fig. 2–6) so that the pipeline cannot rotate with materials on or against the pipes. A guide on the top can (Fig. 2–7, according to claim 26) be useful for the return of the supports and material transport (see below).

Regarding 1. The actual pipeline is completed and transported through the transport supports one pipe length further after welding in the central warehouse.

Regarding 2. As shown in claim 27, the individual pipes are movably connected for transport by the supports (Fig. 3, e.g., with short chains or clamps). The supports, as well as the intermediate pieces/adapters, can be completely or in prefabricated, quickly assembled individual parts transported on or in pipelines with a large diameter, also in the pipeline (according to claim 28). For completion, the intermediate pieces/different adapters, which were selected and temporarily mounted on the pipeline depending on the angle/bend of the pipeline (as shown in claim 29), are, for example, welded together by a welding robot. A welding robot can, for example, be installed on a tracked vehicle but also “drive” over the pipeline (according to claim 30) and weld the pipe ends, possibly also the connecting pieces. As shown in claim 31, the adapters or connecting pieces can also be mounted on a pipe end of the individual pipes from the start of the pipeline in the central warehouse, so that no weld seam is required on-site.

If the pipeline is to run underground, the transport supports (according to claim 32) must be equipped with crossbars and stand over the trench created by the trench cutter. The transport supports must be constructed so that they can move apart.
If the pipeline is to be lowered from the end of the pipeline, the transport supports and no longer needed parts can be brought back to the central warehouse on the pipeline (with a guide on top, according to claim 34). Alternatively, the supports would have to be collected again by a tracked vehicle, which requires a great deal of effort. With large pipe diameters, these parts can also be sent back to the central warehouse in the pipeline.
As shown in claim 35, the power supply of the transport rollers (Fig. 3–2), for example, can be provided by batteries, solar cells with batteries, (possibly temporary) power cables on or in the pipes, or at least one insulated power rail attached to the outside of the pipe. The pipe as a second power line is not recommended. Wireless power transmission is also possible via alternating current or conversion of direct current to alternating current.
The transport supports of the pipeline sections should be open at the top for transporting the pipeline (Fig. 3). If necessary, after completing the entire pipeline, an upper fastening of the pipeline is made, as shown in claim 36, so that the pipeline is fixed on all sides. The upper fastening can be pre-installed on the supports with a joint (Fig. 4–5), so it only needs to be folded over the pipeline and fastened. If necessary, the transport support can be closed from the beginning (Fig. 4, 1 to 4).

Claims

1. Pipelines installed in the shortest time with additional transport capabilities using production and laying vehicles or transporting supports,

characterized in that pipelines with extremely large diameters can also be produced very quickly on-site or automatically transported and have additional transport options.

2. Pipelines installed in the shortest time with additional transport capabilities using production and laying vehicles or transporting supports, according to claim 1,

characterized in that the laying of the pipeline is carried out by a tracked vehicle/crawler that manufactures/synthesizes the pipeline on the one hand (e.g., curing of chemicals in a ring hardener/ring reaction tube, depending on the type of reaction with or without ring-shaped UV light, possibly in combination with other materials) and simultaneously digs trenches. If the machinery and equipment do not all fit on one vehicle, at least a second vehicle connected to the first vehicle can be used.

3. Pipelines installed in the shortest time with additional transport capabilities using production and laying vehicles or transporting supports, according to one of the preceding claims,

characterized in that the curing pipeline is guided until the plastic is fully cured, depending on the chemical reaction, over several meters and exits at the end of the tracked vehicle. For materials that take a few minutes to cure (e.g., flash cement), the reaction tube must be longer.

4. Pipelines installed in the shortest time with additional transport capabilities using production and laying vehicles or transporting supports, according to one of the preceding claims,

characterized in that the synthesized pipeline is laid directly into an existing trench.

5. Pipelines installed in the shortest time with additional transport capabilities using production and laying vehicles or transporting supports, according to one of the preceding claims,

characterized in that there are many additional applications on or in the pipeline (various "rails", additional small pipes—inside or outside, a pipe division, a gear base, non-circular external supports—also serving as channels, multiple chambers, guides, etc.).

6. Pipelines installed in the shortest time with additional transport capabilities using production and laying vehicles or transporting supports, according to one of the preceding claims,

characterized in that a frame extends from the laying vehicle into the freshly created pipeline section or up to the "rails" on the pipeline.

7. Pipelines installed in the shortest time with additional transport capabilities using production and laying vehicles or transporting supports, according to one of the preceding claims,

characterized in that transport aids in the pipeline—such as containers—are returned to the second half of the pipeline or on the pipeline via a frame.

8. Pipelines installed in the shortest time with additional transport capabilities using production and laying vehicles or transporting supports, according to one of the preceding claims,

characterized in that the pipeline is secured with metal rods shot or screwed into the ground (as with an earth drill) or "injected" anchors (e.g., via tubes that are withdrawn after curing).

9. Pipelines installed in the shortest time with additional transport capabilities using production and laying vehicles or transporting supports, according to one of the preceding claims,

characterized in that an above-ground pipeline is supported by pipes or triangular channels attached to the base.

10. Pipelines installed in the shortest time with additional transport capabilities using production and laying vehicles or transporting supports, according to one of the preceding claims,

characterized in that after laying the entire pipeline, the tracked vehicle completes many residual tasks or installations: filling trenches, creating branches and tapping points, considering compensators for expansion due to heat, valves, shut-off valves, gate valves, taps, pumps, measuring devices, control elements, heat and cold insulation (use of expansion pieces/compensators), etc.

11. Pipelines installed in the shortest time with additional transport capabilities using production and laying vehicles or transporting supports, according to one of the preceding claims,

characterized in that huge pipelines with filters are laid.

12. Pipelines installed in the shortest time with additional transport capabilities using production and laying vehicles or transporting supports, according to one of the preceding claims,

characterized in that branches and tapping points are installed on the pipeline.

13. Pipelines installed in the shortest time with additional transport capabilities using production and laying vehicles or transporting supports, according to one of the preceding claims,

characterized in that the pipeline consists of extra pipes for materials or cables made of quickly curing, environmentally friendly, easily recyclable plastic, steel, or flash cement/cement/concrete, etc. The pipeline can run above ground, partially in a trench, when crossing roads and other obstacles, or entirely underground.

14. Pipelines installed in the shortest time with additional transport capabilities using production and laying vehicles or transporting supports, according to one of the preceding claims,

characterized in that the pipeline is equipped with supports, which can also be transported through or on the pipe in individual parts.

15. Pipelines installed in the shortest time with additional transport capabilities using production and laying vehicles or transporting supports, according to one of the preceding claims,

characterized in that the pipeline is made of or consists of multiple layers (plastic, metal, cement, fabric, etc.).

16. Pipelines installed in the shortest time with additional transport capabilities using production and laying vehicles or transporting supports, according to one of the preceding claims,

characterized in that if a central power supply is not available, solar cells (photovoltaics) generate power on the pipelines and, if mostly above ground, on the pipelines for pumps.

17. Pipelines installed in the shortest time with additional transport capabilities using production and laying vehicles or transporting supports, according to one of the preceding claims,

characterized in that material transport can be carried out inside the pipeline or on the outside of the pipeline: e.g., chemicals, steel in balls/powder, fuel, plastic, hardeners, water, food, etc.

18. Pipelines installed in the shortest time with additional transport capabilities using production and laying vehicles or transporting supports, according to one of the preceding claims,

characterized in that the back-and-forth material transport in or on the pipeline takes place in small containers ("packages") with compressed air as a kind of "pneumatic tube".

19. Pipelines installed in the shortest time with additional transport capabilities using production and laying vehicles or transporting supports, according to one of the preceding claims,

characterized in that "rails" are synthesized/installed in, on, or on the pipeline (also combinations).

20. Pipelines installed in the shortest time with additional transport capabilities using production and laying vehicles or transporting supports, according to one of the preceding claims,

characterized in that if the focus is less on fluid transmission and more on transport, more stable, smaller pipelines with thicker walls are created.

21. Pipelines installed in the shortest time with additional transport capabilities using production and laying vehicles or transporting supports, according to one of the preceding claims,

characterized in that in a temporary pipeline, a quick dismantling takes place from the end of the pipeline, and the crushed parts are transported back through the (still) existing pipeline for complete recycling.

22. Pipelines installed in the shortest time with additional transport capabilities using production and laying vehicles or transporting supports, according to one of the preceding claims,

characterized in that at

the beginning of the pipeline, i.e., in the central warehouse, the pipes are already welded together.

23. Pipelines installed in the shortest time with additional transport capabilities using production and laying vehicles or transporting supports, according to one of the preceding claims,

characterized in that transport supports are temporarily mounted on each pipe (made of different steels or other materials) or, for pipes with a very large diameter, are transported as individual parts or completely in the pipeline.

24. Pipelines installed in the shortest time with additional transport capabilities using production and laying vehicles or transporting supports, according to one of the preceding claims,

characterized in that the supports transport the steel, plastic, concrete, or other pipes further to the next support using electrically operated transport rollers.

25. Pipelines installed in the shortest time with additional transport capabilities using production and laying vehicles or transporting supports, according to one of the preceding claims,

characterized in that a guide is attached or synthesized at the bottom of the pipes.

26. Pipelines installed in the shortest time with additional transport capabilities using production and laying vehicles or transporting supports, according to one of the preceding claims,

characterized in that a guide is attached or synthesized on top of the pipeline.

27. Pipelines installed in the shortest time with additional transport capabilities using production and laying vehicles or transporting supports, according to one of the preceding claims,

characterized in that the individual pipes are movably connected for transport by the supports (e.g., with short chains or clamps).

28. Pipelines installed in the shortest time with additional transport capabilities using production and laying vehicles or transporting supports, according to one of the preceding claims,

characterized in that the supports, as well as the intermediate pieces/adapters, are completely or in prefabricated, quickly assembled individual parts.

29. Pipelines installed in the shortest time with additional transport capabilities using production and laying vehicles or transporting supports, according to one of the preceding claims,

characterized in that the intermediate pieces/different adapters and the pipes are connected (for example, with a welding robot in the case of steel) upon completion of the pipeline.

30. Pipelines installed in the shortest time with additional transport capabilities using production and laying vehicles or transporting supports, according to one of the preceding claims,

characterized in that a welding robot is installed on a tracked vehicle or can “drive” over the pipeline.

31. Pipelines installed in the shortest time with additional transport capabilities using production and laying vehicles or transporting supports, according to one of the preceding claims,

characterized in that the adapters or connecting pieces are already mounted on a pipe end of the individual pipes from the start of the pipeline in the central warehouse.

32. Pipelines installed in the shortest time with additional transport capabilities using production and laying vehicles or transporting supports, according to one of the preceding claims,

characterized in that in underground pipelines, the transport supports are equipped with crossbars and stand over the trench created by the trench cutter. The transport supports must be constructed so that they can move apart.

33. Pipelines installed in the shortest time with additional transport capabilities using production and laying vehicles or transporting supports, according to one of the preceding claims,

characterized in that in a permanent pipeline, all parts no longer needed can be quickly deinstalled.

34. Pipelines installed in the shortest time with additional transport capabilities using production and laying vehicles or transporting supports, according to one of the preceding claims,

characterized in that "rails" are installed or synthesized on top of the pipeline for parts no longer needed.

35. Pipelines installed in the shortest time with additional transport capabilities using production and laying vehicles or transporting supports, according to one of the preceding claims,

characterized in that the power supply of the transport rollers (Fig. 3–2) is provided by batteries, solar cells with batteries, (possibly temporary) power cables on or in the pipes, or at least one insulated power rail attached to the outside of the pipe. Wireless power transmission is also possible via alternating current or conversion of direct current to alternating current.

36. Pipelines installed in the shortest time with additional transport capabilities using production and laying vehicles or transporting supports, according to one of the preceding claims,

characterized in that the transport supports of the pipeline sections are open at the top for transporting the pipeline and remain so or an upper fastening of the pipeline is installed after completing the entire pipeline. The upper fastening can be pre-installed on the supports with a joint or the transport support is closed from the beginning.

Fig. 1

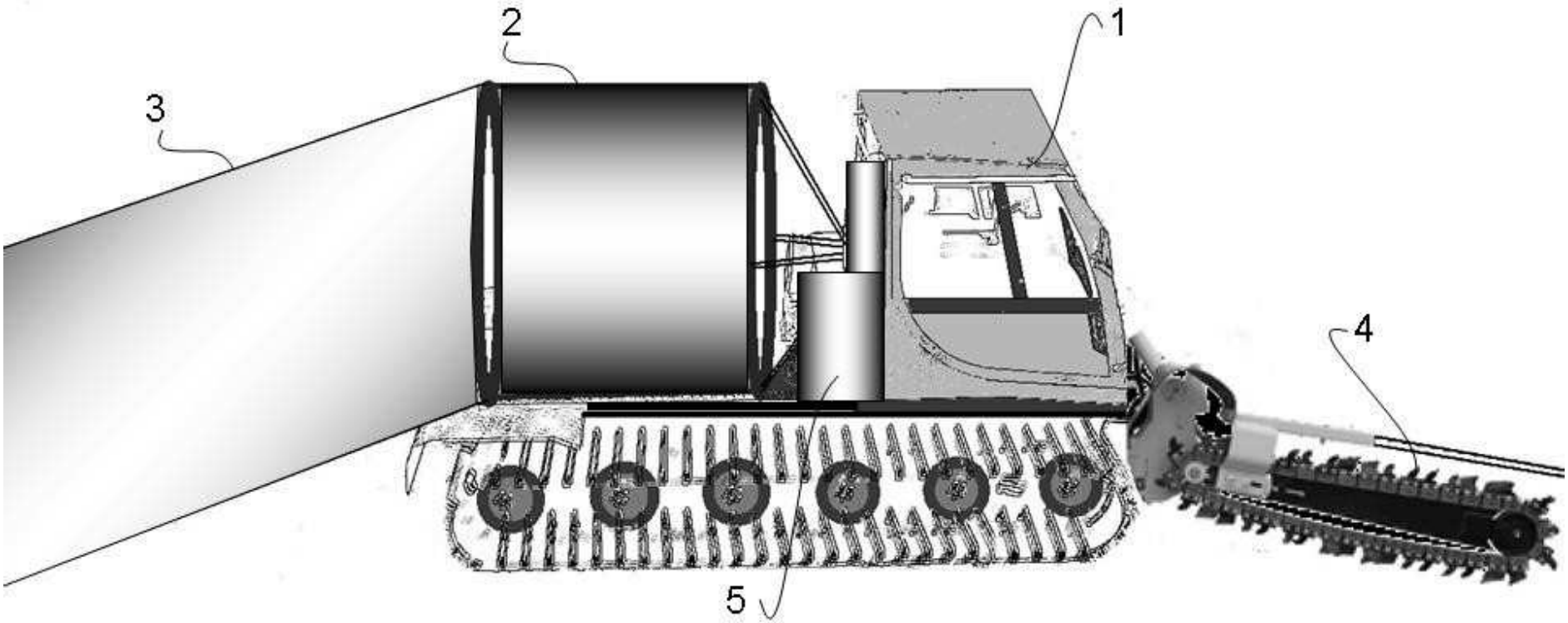

Fig. 2

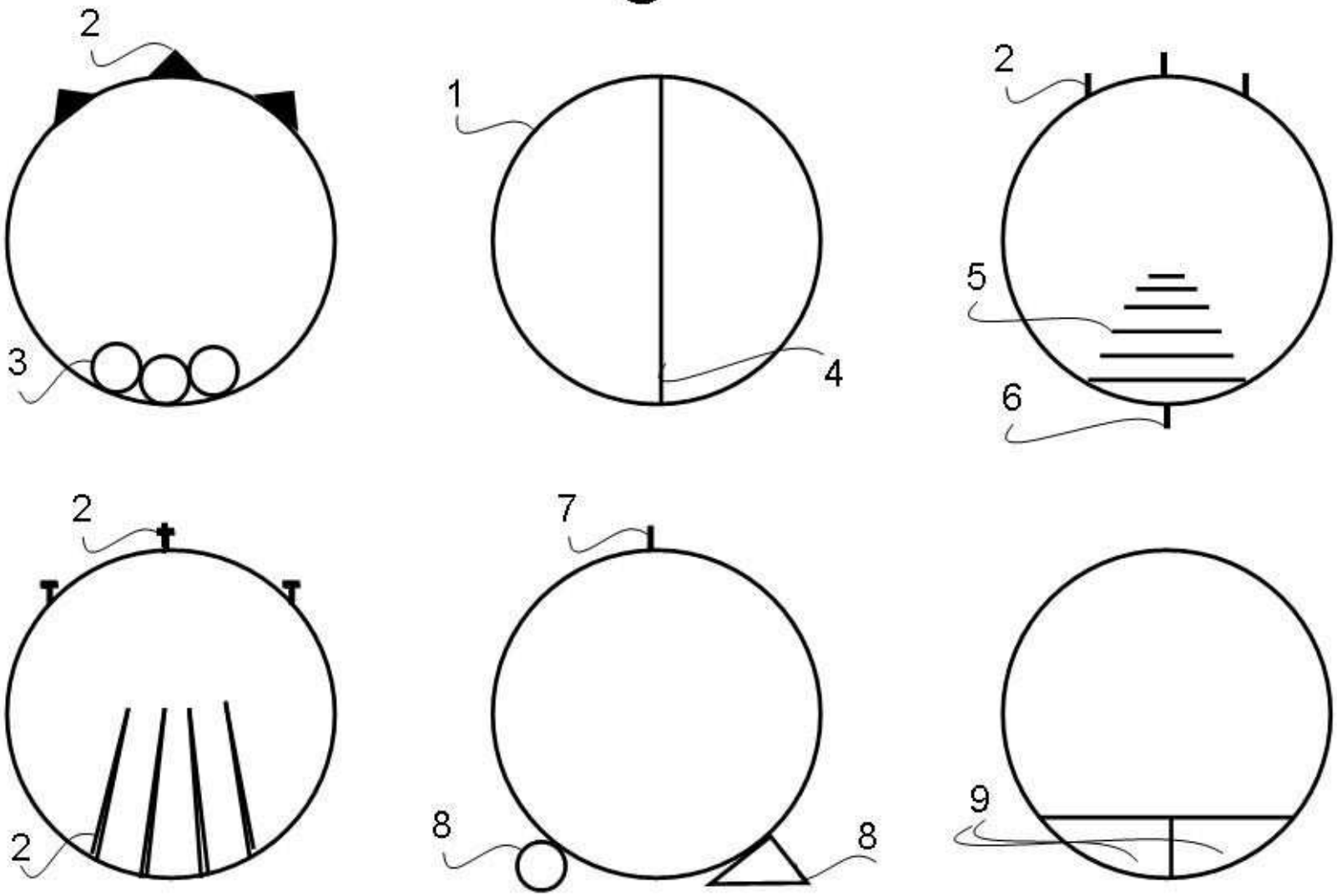

Fig. 3

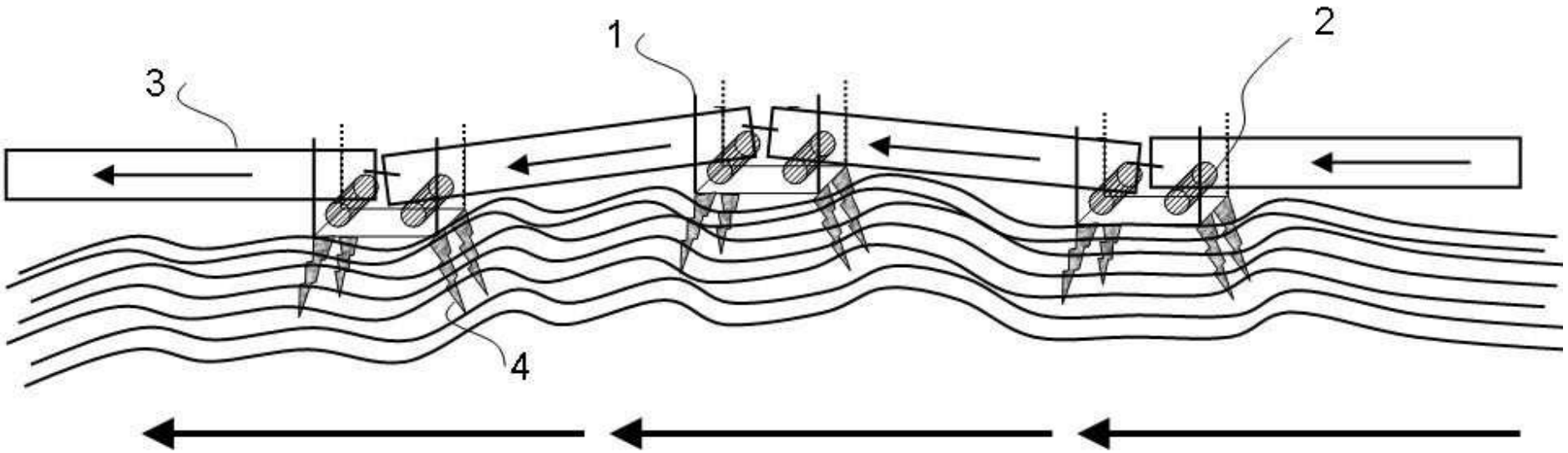

Fig. 4