CONSTRUCTION OF A PASSAGE USING HORIZONTAL DRILLING

Dnipro University of Technology

Polishko Ilya Vadimovych, group 185-21sk-1 FNST
***Scientific supervisor*: PhD, Assoc. Prof. Rastsvietaiev V.O.**

Horizontal drilling is used for pipelines of medium and large diameters. Drilling of wells is carried out by horizontal drilling rigs, which involve preliminary development of the soil with the device of wells in the soil of a larger diameter than the pipe being laid. This method is not recommended for use on weak (water-saturated and loose) soils in order to avoid subsidence of the road surface [1, 2].

The effectiveness of the use of screw installations depends on the correct choice of the design and operating parameters of the installations.

More productive and widespread are unified horizontal drilling auger installations (UGB or GB), which combine the processes of drilling, laying protective casing pipes with continuous removal of soil from the hole (Fig. 1).

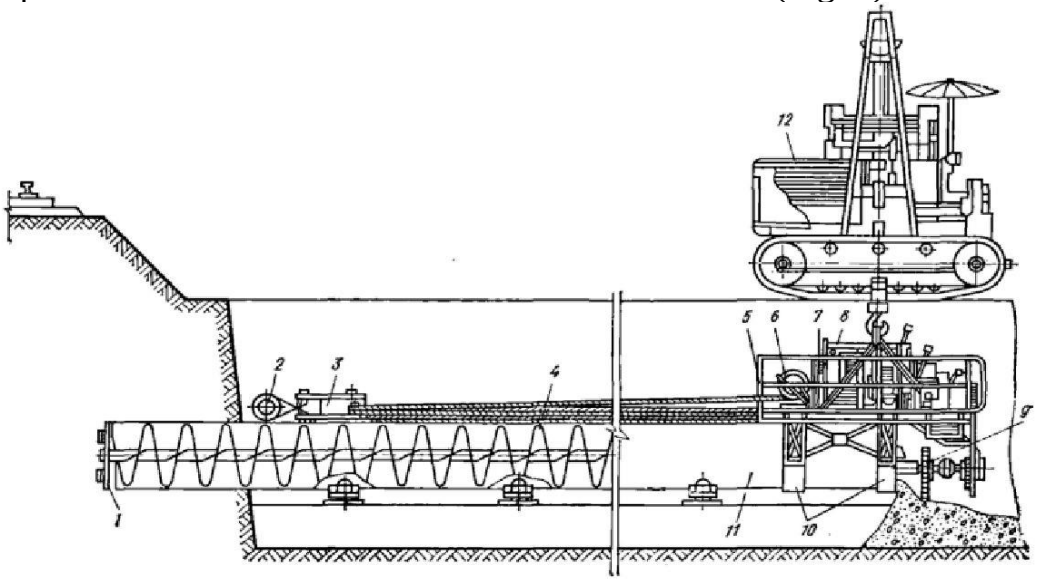

Fig. 1 Schematic diagram of UGB and GB type installations:
1 – cutting head; 2 – stubborn anchor; 3 – polyspast; 4 – screw; 5 – frame;
6 – winch; 7 – cardan shaft; 8 – internal combustion engine; 9 – auger drive shaft;
10 – clamps; 11 - pipe being laid; 12 – pipelayer

With the help of UGB and GB installations, it is possible to lay pipelines in soils up to IV group with a diameter of 325.1420 mm and a length of 40...60 m, with the use of additional equipment up to 120 m. Drilling speed from 1.5.1.8 m/h to 12.7.19.0 m/h

The process of drilling a well and laying a pipeline with the help of type, UGB and GB installations is as follows: during laying, continuous mechanical drilling of the well is carried out by a milling head, and removal of loose soil is carried out by a screw conveyor [3, 4].

Working parameters are considered to be: rotation frequency of the auger and the cutting head; drilling speed, feed and chip thickness; coefficients of soil loosening, cross-section filling and auger volume; the performance of the auger conveyor, the

power and energy consumption of cutting and transporting the soil, the effort to feed the cutting head and push through the casing [5].

The PM-800-1400 machine is designed for laying pipes with a diameter of up to 1420 mm in any soil conditions, except for floats and rocks (Fig. 2).

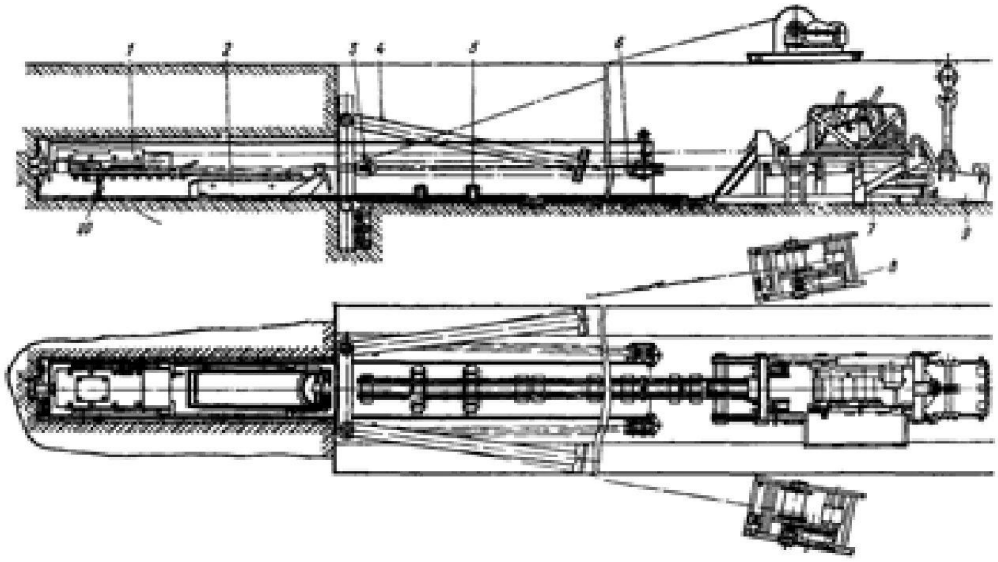

Fig. 2 Scheme of the machine for trenchless laying of pipes PM-800-1400: 1 - cutting head; 2 – scoop; 3 – block clamps; 4 – supporting wall; 5 - guide frame; 6 – admiration; 7 - unloading and traction device; 8 - supply winches; 9 – capacity; 10 - loading check valve

The installation with the installed power of electric motors of 24.6 kW can lay pipes up to 100...120 m long with an average productivity of up to 15 m/shift. In the process of advancing the pipe, the soil is pulled out of it using a scoop, which after loading is pulled out of the pipe using special devices, unloaded either into a pit or into a container.

It is also possible to use PVA-320-type grain drills with a maximum drilling length of 120 in soils up to VI gr. The work technology is similar to horizontal drilling installations and consists in drilling a pilot well of a small diameter (up to 180...200 mm) and mechanical drilling with an auger to the required diameter with simultaneous pressing of the protective casing.

When choosing an oil pipeline route, prospective development of settlements, industrial and agricultural enterprises, roads, railways and other facilities, as well as the conditions of construction and maintenance of the oil pipeline, are taken into account.

According to [6] and [7], among the dangerous geological processes and adverse engineering-geological phenomena in the studied territory, flooding by underground water and flooding by surface water, waterlogging, frost heaving of the soil, seismicity of the territory are noted.

Main pipelines are calculated using the method of limit states. The limit state is the state at which the normal operation of the calculated structure becomes impossible. The first, second and third limit states are distinguished. The first limit state is called the one when the structure under consideration loses its bearing capacity, or, what is

the same, the ability to resist the forces applied to it, i.e. is collapsing The second limit state is characterized by excessive, inadmissible residual deformations or vibrations during operation. The third limit state is determined by excessive cracks that are unacceptable during operation. Neither when reaching the third, nor when reaching the second, the structure is not in danger of destruction, its strength and stability are preserved [8].

Main pipelines laid in the ground are calculated according to the first limit state, i.e. accept that the greatest effort experienced by the pipeline should not exceed its bearing capacity.

For a pipeline laid in the ground, reaching the yield point does not mean loss of performance. The pipeline can be successfully operated until the stresses in it reach the strength limit. When calculating the strength, it is assumed that it is perfectly round. Only internal pressure (the main effect) is taken into account.

The readiness of the pipeline to accept operational loads is checked by hydraulic tests.

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