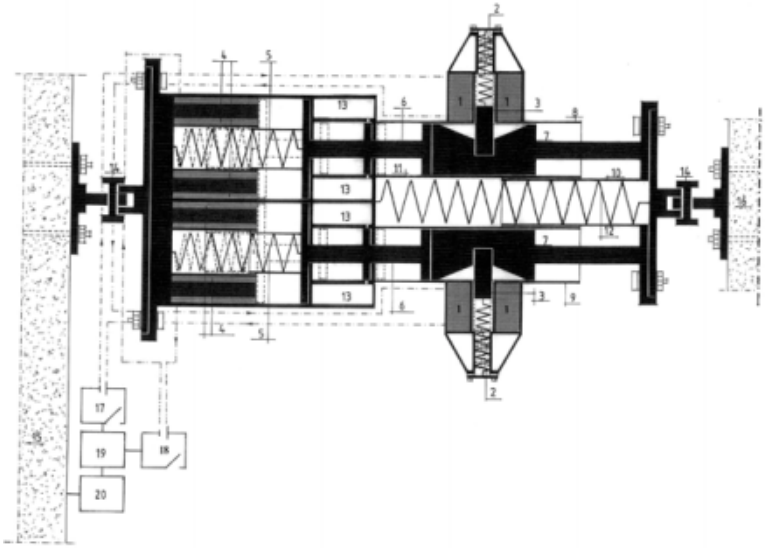
Side Connection with Rigid and Elastic Functions

Figure



Constitution

The connection consists of the following elements:

- ⊄# four hollow longitudinal pipes, two of which are coaxial;
- ⊄# pre-stressed spring arranged according to the longitudinal axis of the connection;
- ⊄# two devices perpendicular to the longitudinal axis. These devices are made up of an electromagnet with a movable nucleus, subject to the action of a contrast pre-stressed spring;
- ⊄# two devices, arranged according to the longitudinal axis, each of these is made up of a rotor, subject to the action of a contrast pre-stressed spring, and linked to a movable piston;
- ⊄# two fixed cores, each of these has an opening for the partial housing of the movable nucleus of the devices of the point 3. The connection has two different functions: of stiff connection of the building to the retaining wall in the state of rest of the soil (absence of the earthquake) and of elastic link in the state of motion of the soil (during the earthquake). The two fold working is possible by the linking of the devices of the point 3. and 4. Through an electric circuit to a system which made up of two current generators of different power, of an electronic central station and of an accelerometer or seismograph.

Operating principle

In absence of an earthquake the movable nuclei (3) of the electromagnet (1), under the action of the contrast pre-stressed springs (2) and the rotors (4) linked to the movable piston (6), under the action of the contrast pre-stressed springs (5), prevent the reciprocal longitudinal translation of the pipes system (8), (9), (11) and the pipe (10) coaxial to (11). In this situation the connection is stiff.

During the earthquake the accelerometer (or the seismograph) (20) in contact with the retaining wall (15), records the acceleration (or the intensity) of the earthquake and the electronic central station (19) closes the electric circuit of the current generators (17) and (18), respectively connected to the electromagnets (1) and (4). The passage of current into the electromagnets causes the rising of attractive forces of the movable nuclei (3) and of the rotors with movable pistons (6),

overcoming the elastic forces of the contrast pre-stressed springs (2) and (5) and unclasping in this way the fixed system of pipes (8), (9), (11) from the pipe (10).

At the same time the liquid of the containers (13) is sucked in from the movable pistons (6) filling the expansion chambers. In this situation the connection becomes elastic, because it is subject to the elastic reaction of the pre-stressed spring (12) which balances, at every instant during the earthquake, the inertial force in the building and the friction force between the building and the foundation-soil complex.

At the end of the earthquake the electronic central station (19) opens the electric circuit; the generators (17) and (18) do not deliver current; consequently the magnetic field induced by the electromagnets (1) and (4) stops and the movable nuclei (3), under the action of the elastic force of the pre-stressed springs (2), penetrate into the opening of the fixed nuclei (7), after a possible displacement of the building has gradually been annulled (removal of the liquid from the compression chambers) by the elastic force of the springs (5), linked to the rotors with movable pistons (6).

The intensity of this force must be not smaller than the friction force between the building and the foundation-soil complex. In this situation, being the pipes system (8), (9), (11) and the pipe (10) reciprocally locked, the connection is stiff.

N.B. **The device needs accurate experimental tests**