pressure of the hydraulic press is removed. Hence the straining of the test-piece is carried out by gradually withdrawing the supporting pressure. Extension tests of specimens at atmospheric pressure are carried out in the same apparatus by means of an additional adaptor.

Automatic recording of the curves of the force-strain co-ordinates, is achieved with an apparatus consisting of wire contact resistances a single-channel electronic amplifier, an oscillograph circuit and other gear, assembled as in the diagram given in Fig. 2.*

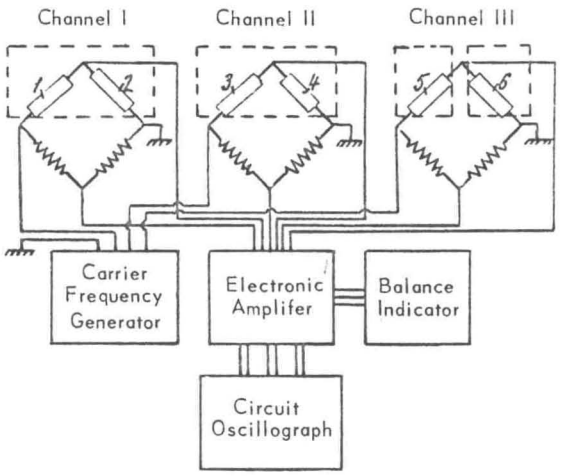


FIG. 2. Electrical circuit diagram of the apparatus.

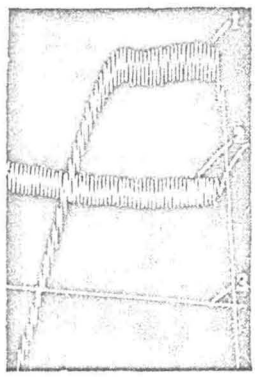
The first channel of the circuit is designed to measure the deforming force applied to the test-piece. A measuring bridge is connected to the wire resistance contacts. One of the bridge arms consists of a working contact, pressing against the surface of the spindle 11 which transmits the extending force to the test-piece. The elastic strain thus arising in the spindle is received by the working contacts. The strain on the contact produces a change in its resistance and leads to a small current forming on the measuring diagonal. Alternating current of the frequency of sound is fed to the input diagonal of the bridge. The electronic amplifier has two functions: firstly, it supplies the measuring bridge with current at about five volts at a frequency of 5,000 c/s and secondly, amplifies, detects and filters the current led off from the measuring diagonal of the bridge.

To remove the effect of pressure on the neighbouring bridge-arm a compensating contact is included, attached to a disk made of the same material as the spindle. Both contacts are placed within the high pressure container and are connected to the outer part of the system by tapered electric leads. To ensure identical temperature conditions the working and compensating contacts are placed in series. The remaining arms of the bridge circuit were designed with constant resistances each of which is equal to the value of the nominal resistance of the contact.

Calibration of the contacts is done at atmospheric pressure according to the compressive force measured by a control dynamometer.

The second channel of the system is designed to measure the deformation of the test-piece, the degree of deformation of a test-piece was measured by the deflection of a small beam closely connected to the lower end of the moving spindle. To convert the mechanical deformation of the beam to electrical oscillation a special measuring bridge is used, also connected to the wire resistance contacts. The contacts (working and compensating) are attached to the horizontal surface of the beam. Calibration of the beam with its contacts is done by indicator readings with an accuracy of 0.01mm.

The third channel of the system is used to measure the variation in hydrostatic pressure in the chamber by means of a manganin pressure gauge. Further, fluid pressure within the chamber is additionally tested by the readings from a manometer for super-high pressure, rated for pressures up to 16,000 kg/cm².



1, stress;

2, pressure;

3, deformation.

FIG. 3. Oscillogram obtained during the deformation of hardened beryllium bronze under a pressure of 3000 kg/cm²;

From the oscillograms values are determined for force, strain, pressure and the nature of their

* M.G. Kozhukhov took part in the arrangement and setting up of the electrical circuit.