External fixation devices

- The next stage of development of external fixation devices (AVF) is associated with the use of a different biomechanical ideology, developed in 1951 by G. A. Ilizarov. He proposed and introduced into clinical practice the method of compression-distraction osteosynthesis, carried out by means of external fixation spokes, in which the role of the external frame is performed by rings.

Advantages of the method

- The versatility of the system
- Minimal surgical intervention
- Using thin metal spokes with a diameter of 1.5-1.8 mm reduces the number of inflammatory damage to the skin, muscles, nerves and bones;
- Reducing the time spent in the hospital, most of the treatment is carried out on an outpatient basis
- Secondary trophic effects, ulcers, fistulas, skin defects can be cured without the use of implants or skin flaps

Disadvantages of the method

- Difficulties in assembling the device. The complexity and duration of the Assembly and overlay processes, replacing elements on the patient.
- Multi-subject set
- The difficulty of elimination of rotational displacements, the limited ability to precisely controlled and strictly metered hardware reduction
- a long stay in the device causes pain swelling stiffness of the joints, restriction of movement
- All external retainers create a risk of introducing local surface infection through the spokes and rods

- **There are two main types of devices: with crossed spokes (Volkova — Oganesyan, ilizarova, Kalnberza, Sintez, Demyanova, etc.) and with single-plane conducting them (Gudushauri, Sivasha, Tkachenko-Gaidukova**
- More than 90% of all designs of external fixation devices in our country apply the ideology or technical solutions developed by G. A. Ilizarov (crossing spokes, spokes with a stop, hinges, etc.)

Gudushauri aparatus

- Advantages ease of application and devices for spokes, the possibility of controlled hardware correction of lateral and angular displacements in the frontal plane, and calibration of rods
- Disadvantages difficulty of eliminating angular displacements in the sagittal plane, insufficient stability of fixation, and limited capabilities of controlled hardware reposition in one plane.

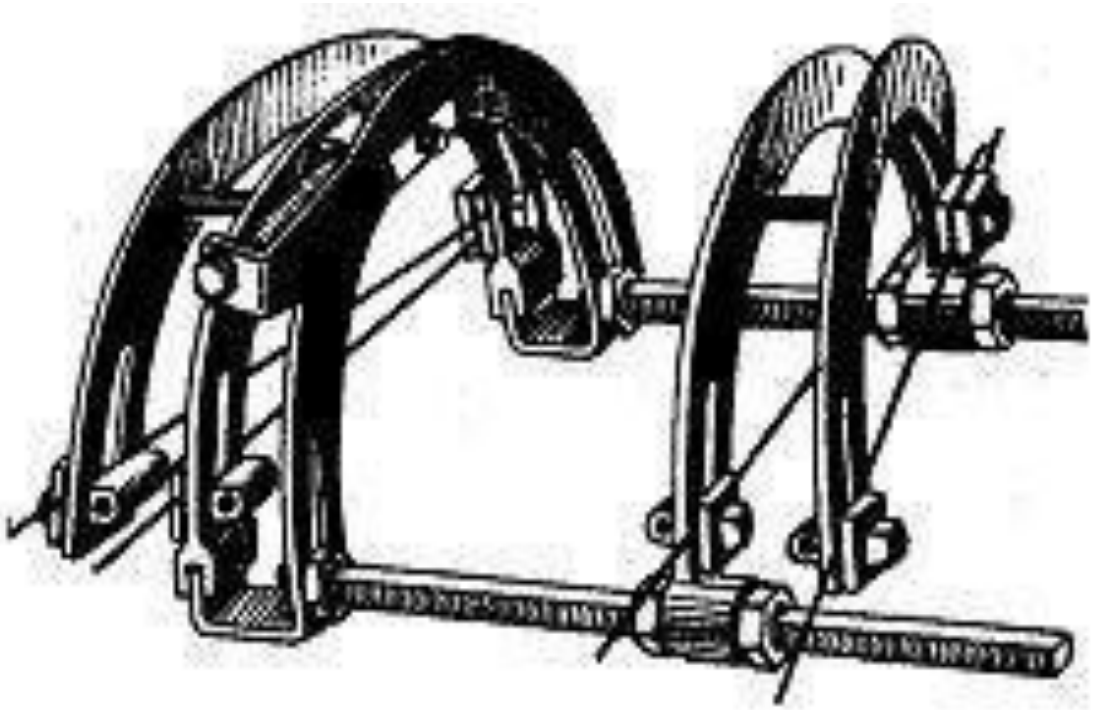
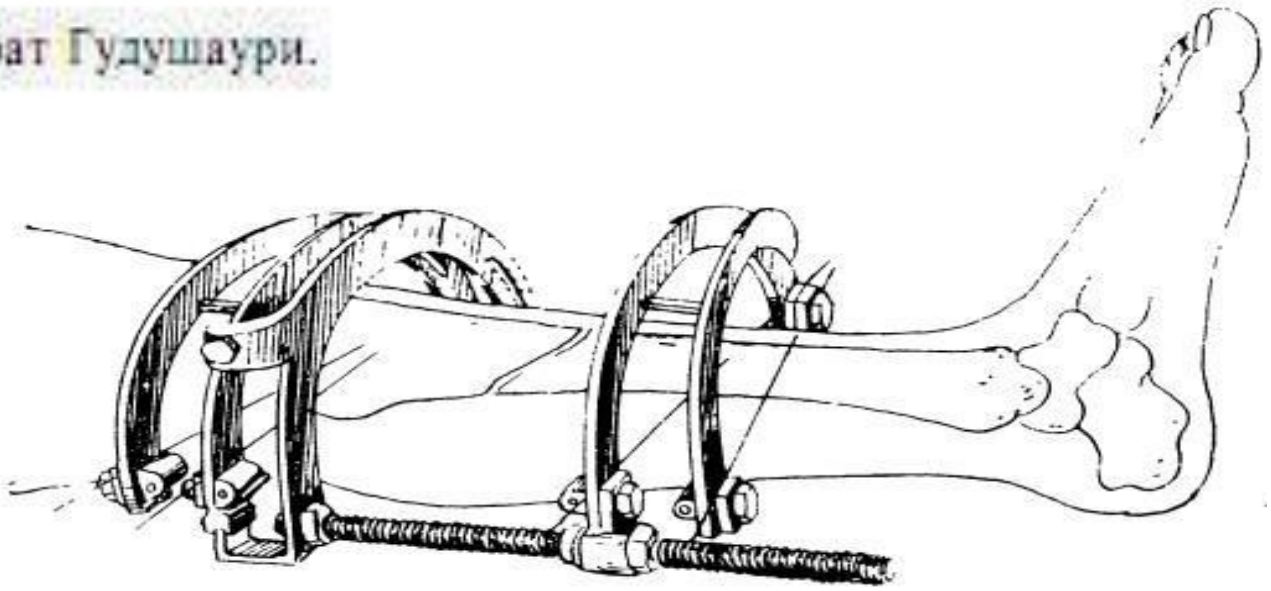


Рис. 84. Аппарат Гудушаури.



Volkov-Hovhannisyan Apparatus

- In 1971, M. V. Volkov and O. V. Oganesyan created an external fixation device for extra-focal transosseous osteosynthesis with intersecting spokes, which made it possible to increase the structural strength and rigidity of fixation of bone fragments. In the future, they used hinges and adjustment elements that guide the movement of the supports along the specified trajectories. These devices are widely used to eliminate contractures and arthroplasty of joints

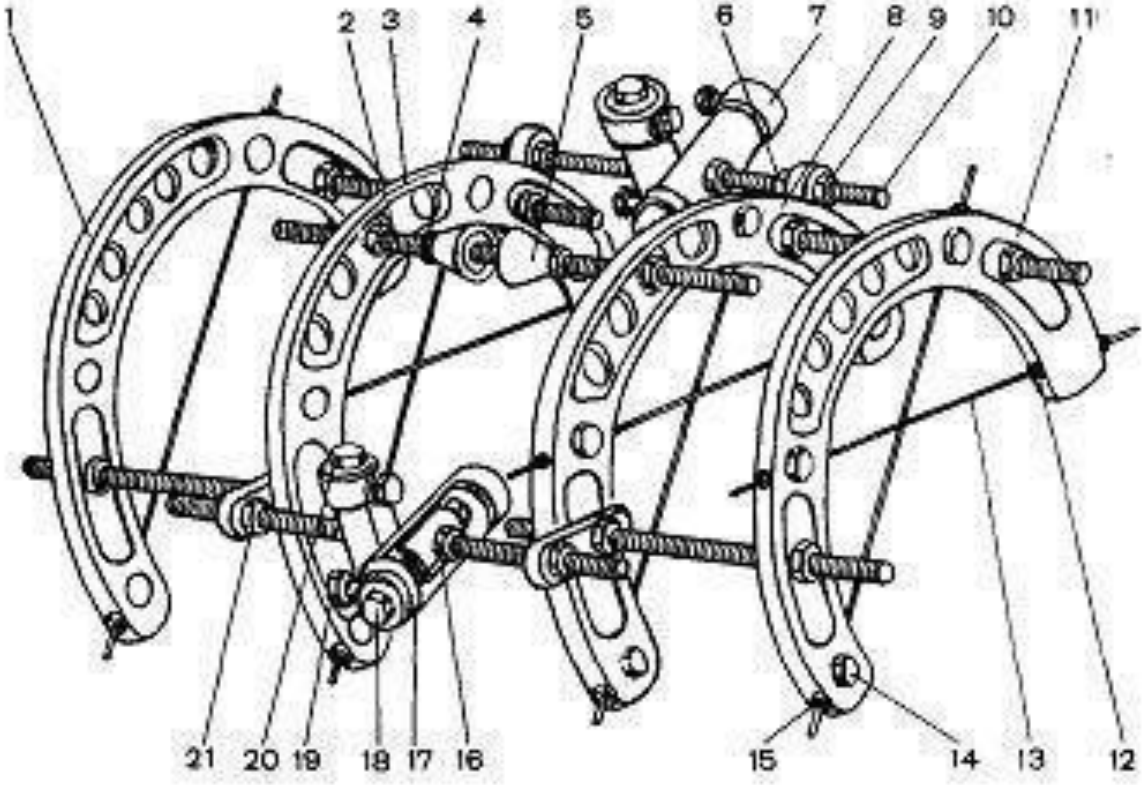


Рис. 77. Аппарат Волкова — Оганесяна

"Stress"devices and "rigid"devices

- advantages: easy of installation and performing individual stages manually; the ability to perform permanent and functional compression and distraction; low weight and minimal metal consumption; partial x-ray transparency of nodes; the ability to connect rods and rings of circular cross-section at different angles; ease of replacing spoke clamps and rods
- Disadvantages: the multi-object nature of the kit, the duration of installation and the inability to fix displacements, the difficulty of eliminating rotational displacements, the impossibility of metered controlled hardware correction

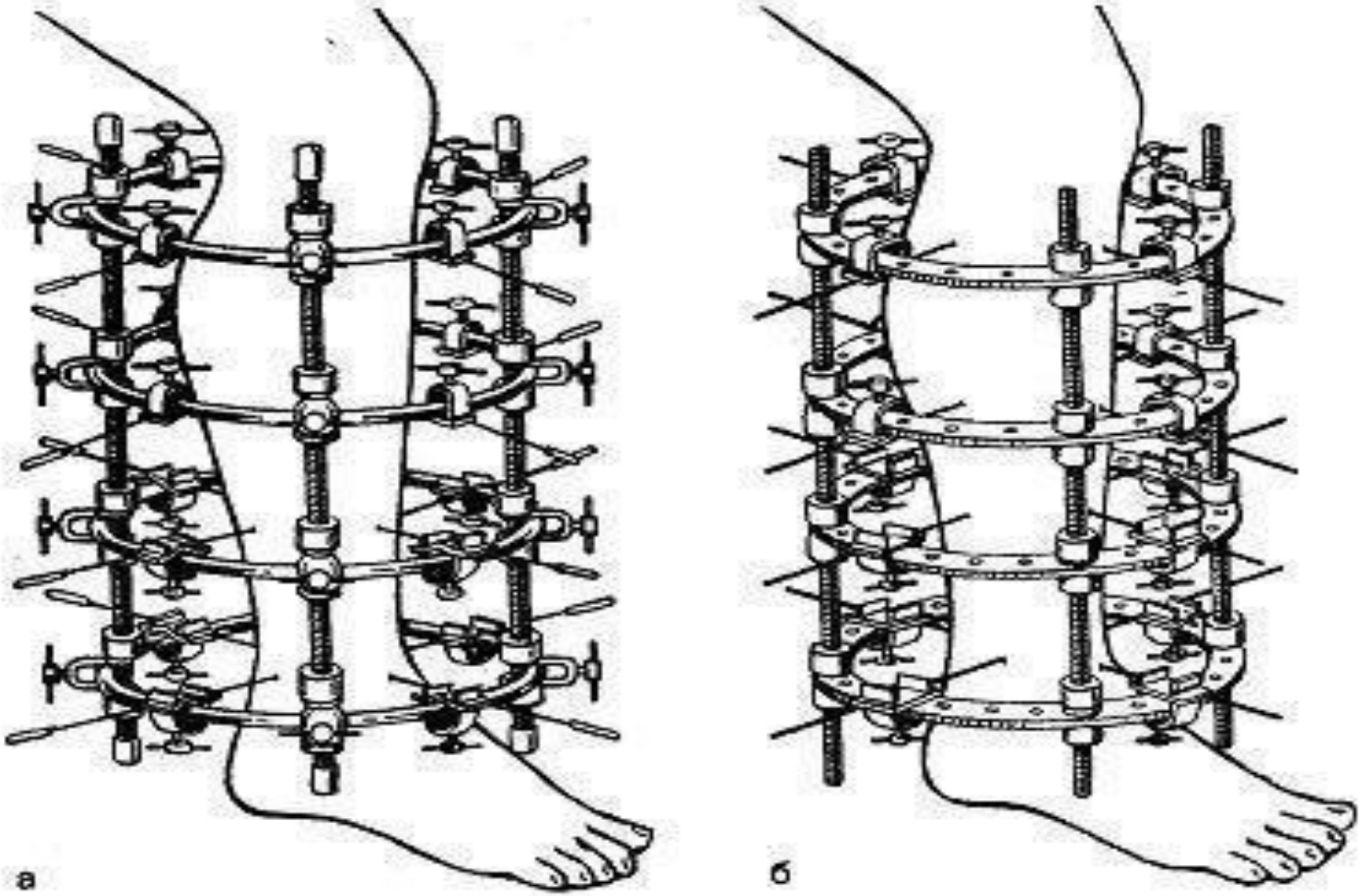


Рис. 79. Аппарат Калиберза.

а — «стресс-аппарат»; б — «ригид-аппарат».

Tkachenko-Abushenko apparatus

- The Tkachenko-Abushenko apparatus consists of 2 arcs connected by rods In each arc, pull 2 spokes drawn through the articulating bones. The side distraction rods are connected by arcs using hinged devices. The device practically performs skeletal traction, but the addition of a rod with a screw thread on the hinges of the arcs in the Tkachenko — Abushenko device also allows you to apply force for flexion (extension) in the joint

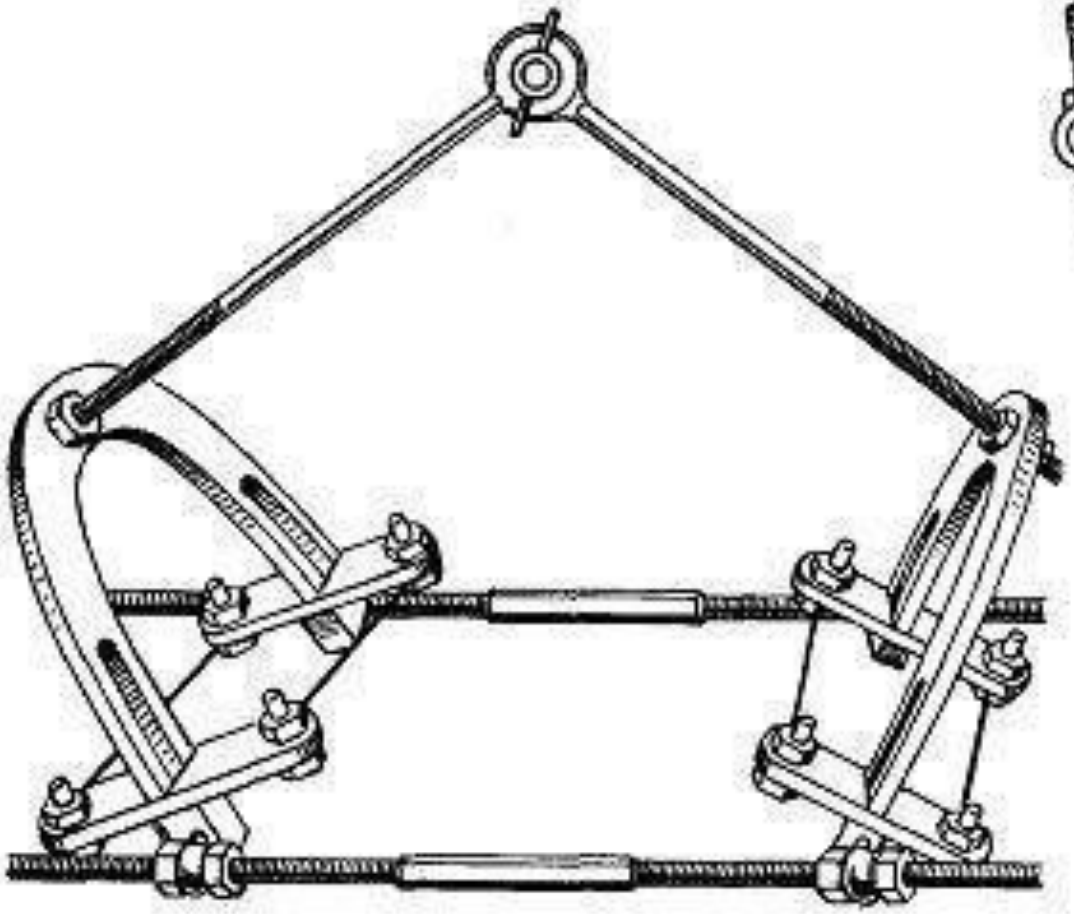


Рис. 95. Апларат Ткаченко — Абушенко.

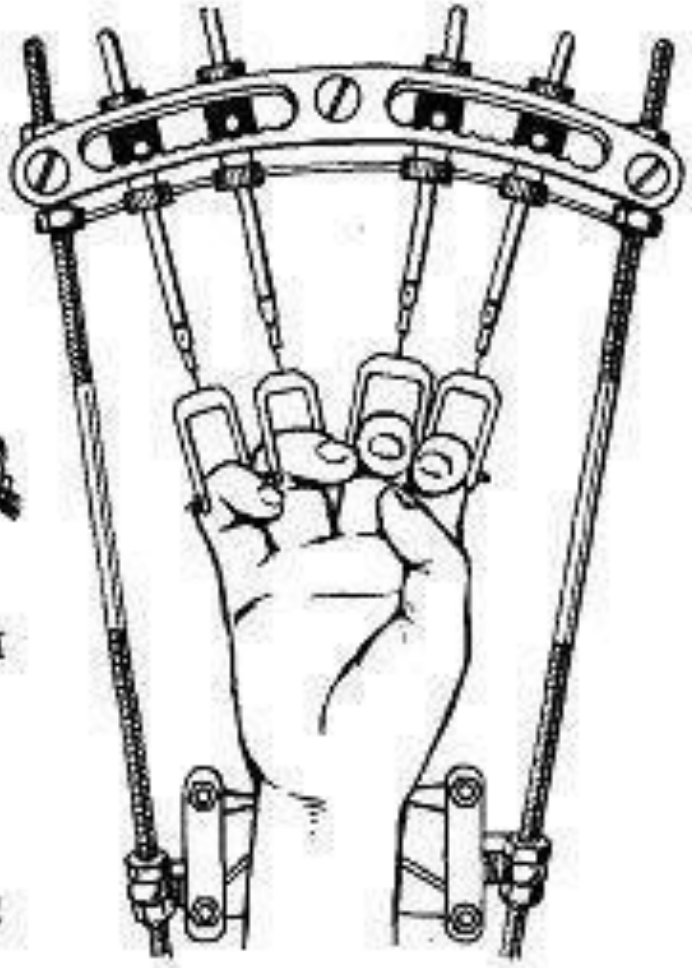


Рис. 96. Устранение контрактуры пальцев с помощью аппарата.