The slits and plates, together with the halfmoon plates for the formation of sutures, are the basic elements of the stitching part of the apparatus. The slits are for charging the magazines with staples and serve as guides for them during the stitching of tissues.

The plates push the staples out of the slits and transfer from the energy source the forces required for the deformation of the staple.

The forms of the slits and plates currently in use are shown in Fig. 1. There are closed and open slits. In the closed slits, the longitudinal walls are thick. The open slits have in one or both longitudinal walls auxiliary windows (Fig. 1, b, c), which enable the strength of the plates to be increased by stiffening ribs.

The width of the slits and the thickness of the staple part of the plates are made equal to the diameter d of the staple wire and the length, equal to the length B of the staple. The relation between the wire diameter and the width of the staple and the dimensions of the slits and plates in the apparatus for making circular sutures have certain peculiarities (Fig. 1, d, e, f). The width of the window of the open slits is \( t \geq B - 6.6d \). Only in the apparatus SGR-20 is the width of the window equal to \( B - 2d \), but for additional immobilization of the staple in the slit, the end face of the slider plate has a special groove (Fig. 2) coaxial with the slit, in contrast to the usual flat working faces of the plates. A set of several clearance fits is used for the fit of the staples and plates in the slits in the longitudinal and cross section.

The experience gained in the manufacture and use of the stitching apparatus has shown that the above-described forms and size relations of the slits and plates and also fits do not always guarantee the fulfillment of the requirements made with respect to them. Problems are always encountered, such as the absence of interchangeability of the magazines and sliders, of abnormal shaping of the staples, breakage of slider plates, technical deficiencies of the magazines and sliders, etc. The possibility of solving these problems is limited by the need for meeting contradictory requirements with regard to shape, size, tolerances and fits for the slits and plates. On the one hand, the clearances determined by the above parameters between the staples and slits, the slits and plates should be sufficient to ensure easy placement of the staples in the slits without distortion of the \( \pi \)-shape, a compensation of the errors in the relative position of the slits and plates, etc. On the other hand, these clearances should be limited in order to ensure a reliable guidance of the staples during sliding from the slits and a normal shaping of the sutures.

The shapes of the slits and plates must be made more complex in order to increase the strength of the plates. However, the difficulty of working with such small dimensions (for soft tissues \( d = 0.1-0.4 \) mm, and \( B = 1-5 \) mm), the difficult assembly of the magazines and sliders, containing a large number of mutually conjugate pairs of slits and plates, require that their shape, as well as the design of the magazines and sliders, are simple and that the manufacturing tolerances should be low.

Whilst the replacement of the metallic magazines by plastic for single use (apparatus of Maline in the USA, the work carried out since 1958 at the VNIKhAI [All-Union Scientific Research Institute of Surgical Apparatus and Instruments] on the use of plastic magazines in stitching apparatus for blood vessels and in the UKL apparatus) enables the problem of the technical deficiencies of the magazines to be solved to some degree, the attempts to simplify the manufacturing technology for the thin plates with stiffening ribs do not radically alter the situation but sometimes result in a quality deterioration of the apparatus. Thus, the composite welded plates with stiffening ribs, used in some models of the UKL apparatus, composed of stamped combs with plates of square cross section instead of integral milled combs with complex profile, are subject to delamination or deformation after short service.
In order to determine the limits within which the form and size of the slits and plates can be varied, special investigations were carried out at the VNIKhAI (1962-1963). Their main results will be given in the following.

The placement of the staples in the slits without jamming and distortion of their shape, the reliable fixation in the initial position and also the required accuracy of guidance of the staples during their ejection from the slits are achieved in relation to the diameter of the staplewire, by means of free running and loose fits of the accuracy classes 3-3a in the cross sections and by loose fits of the accuracy class 3 in the longitudinal sections. The slits can be closed or open with a maximum width \( t = B - 2d \).

A complete ejection of the staples from the slits must be possible even in the case of the most unfavorable relative position of staple and plate and the most unfavorable deviations of the dimensions of the conjugate elements from nominal (Fig. 3). At the same time, the movement of the plates in the slits must be smooth, without wedging and jamming. For the single plates which are guided by the slits and which are self-aligning in them, the above requirements are fulfilled by medium to loose fits of the plates in the cross section and, depending on the guide length of the plates, by close running to loose fits in the longitudinal section. These fits can also be used for sectional plates which are not guided by staple slits, but by other elements of the apparatus, if the error in the relative position of the plates and slits can be compensated for by the fit clearances. In the cases where the fit clearances are insufficient, only for staples with \( d > 0.3 \text{ mm} \), an increase in the clearances in the cross sections by decreasing the nominal thickness of the plate is permitted. The degree of overlapping of the back of the staple with the end face of the plate \( \gamma = X/0.5d \) (Fig. 3) should not be less than 0.65.

An increase in the clearances between the slits and plates in the longitudinal section by decreasing the nominal plate length is possible for staples with any wire diameter. An analysis of the geometrical dimensions of the staple back and the plate face acting on it shows that at a radius of curvature of the outer generatrix of the back equal to \( 2d \), the outermost contact points \( A \) between the back and the face of the plate (Fig. 3) are at a distance of \( 2d \) from the wall of the slit and that the parts of the plate corresponding to this distance are idle. On the basis of measurements on a large number of staples, carried out during the control of standard specimens of different designs of stitching apparatus, it was found that after the deformation the bending radii of the staples at the points where the foot goes over into the back do not decrease further. Experimental investigations of the process of suture formation showed that the outermost points of contact of the back with the slider face practically do not vary their position during the entire process of deformation of the staples. This is evident from Fig. 4, where the process of suture formation by means of a \( 0.3 \times 4.8 \text{ mm} \) staple is shown (upper row).