

tion. The serum proteins adsorb to the over-charged dish and make a bed for the cells. Cloning efficiencies of chick cells without feeder layers are usually much higher on such dishes than on commercial tissue culture dishes.—**PROF. HARRY RUBIN, D.V.M.**, *department of molecular biology, University of California, Berkeley.* This invention was developed under *Public Health Service grant No. CA-04774.*

## Flexible Linkage System



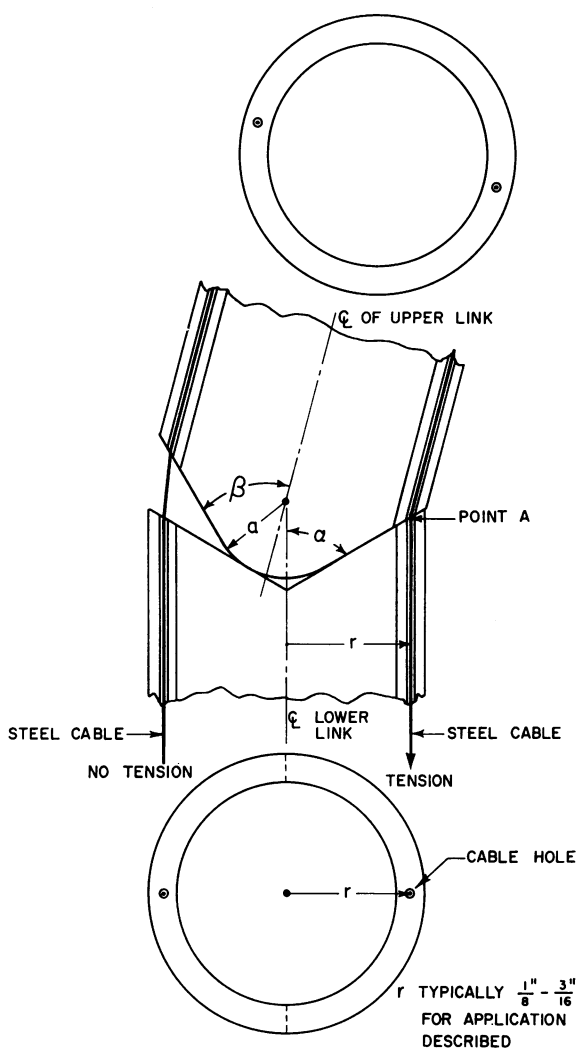
A flexible linkage system with articulated joint, potentially useful in situations involving the need to look inside a relatively inaccessible cavity, has been built. The experimental system was designed as a fiber-optic pharyngoscope for use in examining tissues of the mouth and nasal passages behind the soft palate.

The control cables of the joint (see chart) will not kink when the two elements move, providing unrestricted flexibility in one direction. When many links are used together, a relatively smooth curvature is formed and a probe equipped with this tip can be inserted easily and then flexed for optimum viewing.

The experimental fiber-optic pharyngoscope is controlled by steel cables running longitudinally along the fiber bundle to the main housing. A spring-loaded pulley maintains tension of the cables for all positions of the flexible end.

The optical system consists of a probe containing a light source, a right-angle prism, a lens system, and a fiber bundle to transmit light to a set of viewing optics. The physician can control the brightness of the lamp with a rheostat provided with the instrument.—**ROBERT J. GIBSON, JR.**, *Franklin Institute, Philadelphia, Pa.* This invention was developed under *Public Health Service grant No. A-2833.*

## Flexible linkage for articulated joint



$\alpha$  = angle of V of lower link

$\beta$  = angle of V of upper link

$r$  = radius to wire both links

$a$  = radius of round nose of upper link

When these quantities are related as shown in the equation, the upper link will rotate and slide on the lower link such that no offset in wire holes will occur at point A. Thus no kink will occur in wire.

$$a = r \frac{\sin \alpha - \sin \beta}{\sin (\alpha - \beta)}$$