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ONE CABLE CONTROLLED HYBRID PROSTHESIS

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Abstract

Only one cable is used to operate sequentionally the microswitch controlled electric hand and the cable controlled mechanical elbow with velocity dependent lock control /single cable elbow/.

The operation of the hand or elbow mechanism depends on the pull force executed by the patient.

The hand control needs the low cable pull force and elbow operation needs a higher pull force. The patient is able to differentiate easy the force levels, due to the harness preasure perception.

The aim of the presented work was to develope an arm prosthesis giving the patient simple control of three basic functions only with one control cable. The body power was used for operation of the mechanical elbow and electrical energy for operation of the electric hand. The diagram of the prosthesis presents Fig.1.

The single cable mechanical elbow with inertial separation of the flexion-extension and locking function was used /1/. By pulling the cable, as the first the elbow is unlocked and than flexed. Slow releasing of the cable tension extenses the elbow. Rapid releasing of the cable tension locked the elbow. The characteristic feature of the used elbow is, that control cable, going through the elbow mechanism is lead out in the forearm portion.

time delay between the hand opening movement and the supply "on", functioning only when the hand opening is preceded by the supply "off" state.

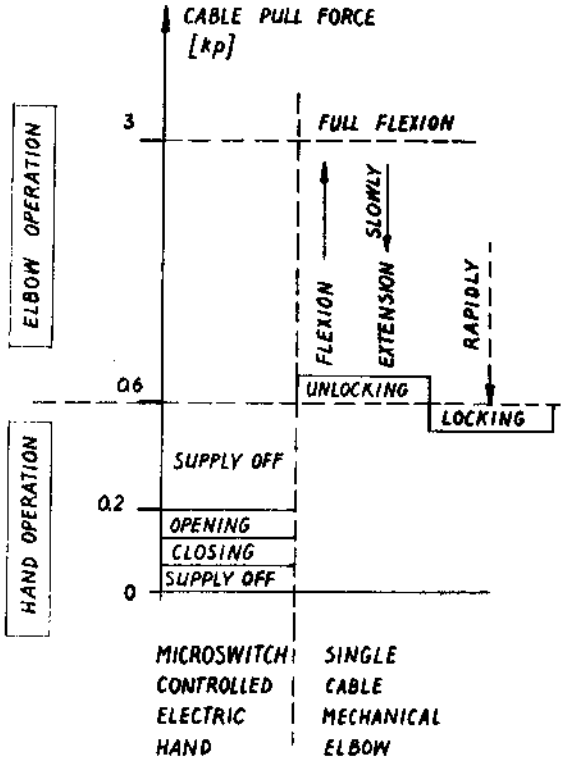
Because of the small value of force needed for hand operation, it is possible to switch on the motor of the closed hand unintentionaly, discharging this way the battery. That was the reason for use of another electronic device, which switches off automatically the motor supply in case of braking the motor's rotation /2/. Avoding the useless discharging of the hand battery by help of the above mentioned device, was the moust important factor for practical realisation of the presented prosthesis.

The clinical evaluation has demonstrated that patient learns easy and fast operation of the prosthesis and prosthesis itself gives them a very good function.

References:

/1/ Ober J., Piątek Z.: Velocity dependent cable control of body powered U.E. prosthetic mechanisms. Procc. V Int. Congr. of Biomechanics 1975. JYVÄSKYLÄ.

/2/ Ober J., Mencel J., Gruchot A.: A new way to achieve more economical energy consumption and bioelectrical hands. Abstracts ISPO, INTERBOR, APO World Congress 1974 Montreux.



PULL FORCE DIAGRAM OF THE SINGLE CABLE ARM PROSTESIS

Fig. 2.

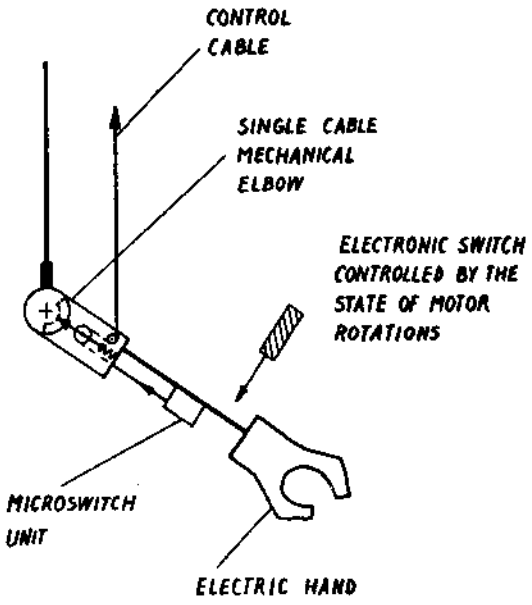


DIAGRAM OF THE SINGLE CABLE CONTROLLED HYBRID ARM

Fig. 1.

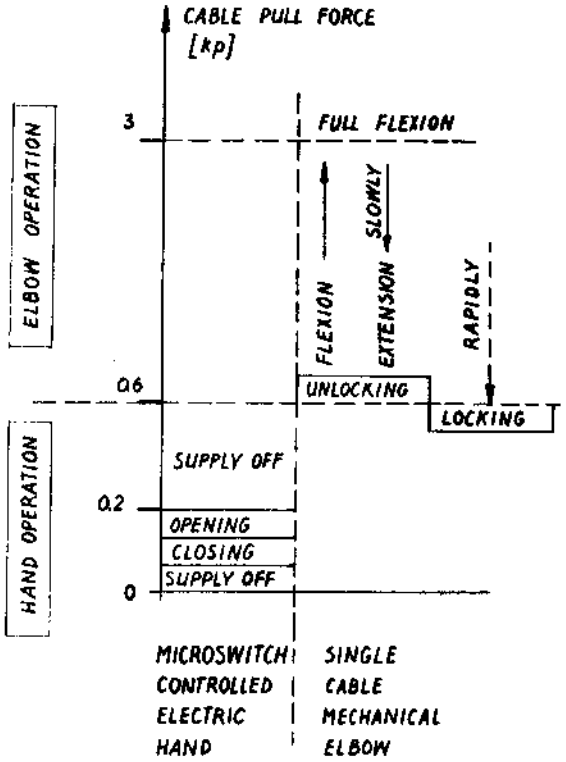


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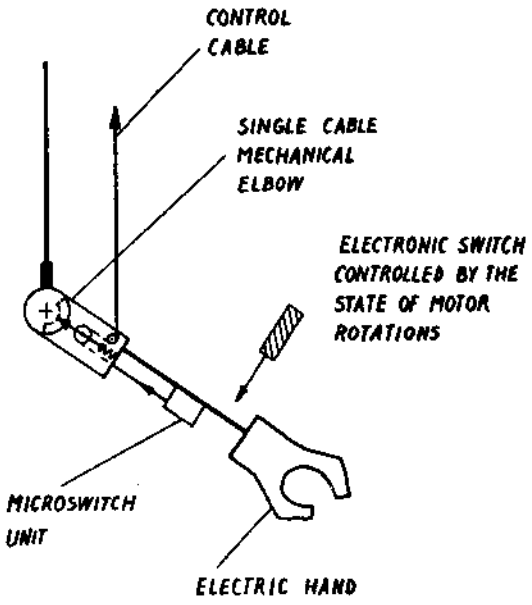
Fig. 2.



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