forces are applied essentially perpendicular to the flat surface of the sidewall opposite the curved wall because of the high pressure region there, which forces are tangential to the axis of the rotor, creating torque and driving revolution of the rotor.

In one particular aspect, the invention provides a cylindrical rotor having channels that extend end to end for use in a rotary energy recovery device for transferring high pressure from one ~~fluid~~ liquid to a lower pressure ~~fluid~~ liquid wherein the rotor will revolve about its axis in a cavity between means that sealingly interface with opposite ends of the rotor, and wherein a high pressure first ~~fluid~~ liquid and a low pressure second ~~fluid~~ liquid are supplied to opposite ends of the rotor resulting in the simultaneous ~~fluid~~ liquid inlet flow and ~~fluid~~ liquid discharge flow axially within said rotor channels, as a result of ~~fluid~~ liquid flow, wherein the improvement comprises: at least a plurality of said channels having a cross section which varies longitudinally from end to end, which variance is the result of shaping an interior surface of a wall portion of each of said plurality of channels, which wall portion is located along what will be the trailing portion of said channel in the revolving rotor, so that a low pressure region is established as a result of axial ~~fluid~~ liquid flow through said channel and as a consequence creates a torque that causes said rotor to revolve, wherein each of said plurality of channels has a cross section of segmental shape with two straight sidewalls and outer and inner end walls and wherein said one sidewall which trails in the motion of the revolving rotor has an airfoil shape and the other sidewall is substantially flat.

In another particular aspect, the invention provides an energy recovery device for transferring high pressure from one ~~fluid~~ liquid to a lower pressure ~~fluid~~liquid, which device comprises a cylindrical rotor having axial channels that extend between opposite end faces, a housing in which said cylindrical rotor revolves, first and second end covers in said housing having interior faces arranged in sealing relationship with said rotor end faces, said end covers each having at least one inlet passageway and at least one discharge passageway extending therethrough, the angular alignment of said end cover passageways being such that, when a rotor channel is aligned with an inlet passageway in one end cover, it is simultaneously aligned with an outlet passageway in the other end cover, and at least two of said rotor channels having a cross section which varies from end to end as the result of one channel sidewall, that is oriented generally radially and that has a shape which

establishes a low pressure region in such channel as a result of ~~fluid~~ liquid flow axially therethrough, so that torque is created causing said rotor to revolve as a result of such flow through said channel, wherein each of said at least two channels has a cross section of segmental shape with two straight sidewalls and outer and inner end walls, and wherein said one channel sidewall has an airfoil shape and the other straight sidewall is substantially flat.

In yet another particular aspect, the invention provides a rotary energy recovery device for transferring high pressure from one ~~fluid~~ liquid to a lower pressure ~~fluid~~ liquid wherein a substantially cylindrical rotor having channels extending axially therethrough revolves about its axis in a cavity between a pair of end covers that sealingly interface with opposite ends of the rotor, and wherein a high pressure first ~~fluid~~ liquid and a low pressure second ~~fluid~~ liquid are supplied to opposite ends of the rotor through passageways extending through said end covers resulting in the simultaneous filling with and discharge of ~~fluids~~ liquids through the passageways in the opposite end covers as a result of ~~fluid~~ liquid flow through said channels, the improvement which comprises at least a plurality of said channels in the rotor having a cross section which varies from end to end as the result of one sidewall region, that is oriented generally radially to the axis, having a shape which establishes a low pressure region along said sidewall region as a result of ~~fluid~~ liquid flow through said channel and as a consequence creates a torque that causes said rotor to revolve, wherein each of said plurality of rotor channels has a cross section of segmental shape with two straight sidewalls and outer and inner end walls, with said one sidewall of each said channel having an airfoil shape and with the other sidewall being substantially flat.

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 is a perspective view of a prior art rotor of a type used in rotary energy recovery devices of this general type.

Figure 2 is a perspective view shown in cross-section of a rotary energy recovery device of this general type that employs a multi-channel rotor.