

07.04. Roller-Engine

Objectives and Basics

At previous chapters were shown several proposals for air-drive engines, where usage of compressed air as working medium results very compact and strong engines. In general, when using water or oil much more dense, even more effective machines should be possible. However two points are problematic.

Particles of liquids sit relative nearby each other, e.g. each nine particles at width and length and height. Between these particles exists relative small space for motions, as soon as one particle moves, neighbouring particles are involved. Opposite, gases exist prevailing by 'empty space', e.g. at air only one place of previous $9 \times 9 \times 9 = 729$ locations is occupied (see also chapter 05.02. 'Three Times Suction Effect'). If air is compressed e.g. to 20 bar at previous air-pressure-machines, still only 20 of about 800 locations are occupied.

So there are wide areas for movements, e.g. at one of previous 'rooms' momentary are only ten particles and at neighbouring room are thirty - and immediately by sound-speed all particles of high-density-room will 'invade' low-density-room (until finally densities are balanced). So gases offer optimum conditions for generating density-differences and automatic coming up balancing-flows into 'suction'.

That's not likely done with 'sticky-mass' of liquids. There for example, speed of flow is only to manipulate by variation of cross-sectional surfaces, e.g. by nozzles. And naturally fast-running flow of water will drag also neighbouring particles, which integrate into fast flow 'by own drive', by scale of independent movements allowed for liquid-particles.

Air-particles 'tremble' all times within space, from one collision to next. As a whole, particles wander towards most long distances until next collision, thus all times towards neighbouring suction-area, if necessary spontaneous also right angle cross to previous flow direction, only one particle or with following many particles - practically not 'bound to common inertia'. That's total opposite for water as all times real compound of 'sticking particles' fly into likely direction and thus showing common inertia of that general direction.

If water rotates fast, inertia comes up in shape of strong centrifugal forces. If water is used as working medium at previous engines, this point is important for organising circulation, otherwise 'sticky-masses' will only hang at outer surfaces and no further movements are possible.

Water merely can be moved inward again (or only by corresponding strong input of power). Centrifugal-neutral movements practically are only possible, if particles keep their radius and move only to and fro into axial directions. At chapter 07.02. 'Meander-Engine' that movement-pattern was used, where all parts of masses keep likely distances to system axis. Now here, alternative possibilities are investigated.

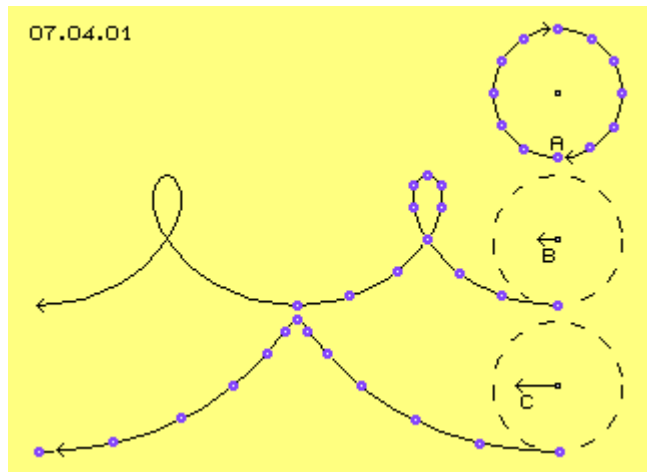
Meander- or Loop-Track

Meander-shaped flow is very fluid-conform movement, for example like rivers move, however all times overlaid by additional turning motion. Fluid-conform is also any movement at circle track, like schematic shown as track of water-particles (blue points) at picture 07.04.01 at A.

If that circled movement is overlaid by movement ahead, e.g. centre of circle B is shifting towards left, garland-shaped track within space comes up. If centre of circle C wanders faster

ahead, track becomes corresponding stretched longer. Both curves show track of one particle, however all particles move simultaneous at analogue tracks.

It's to realize, when original steady turning circled movement is overlaid by linear movement, tracks change into alternating sections of acceleration and of deceleration. Mechanic turning momentum can be drawn off deceleration of flow, while acceleration of water at least by parts can be done by suction-effects.

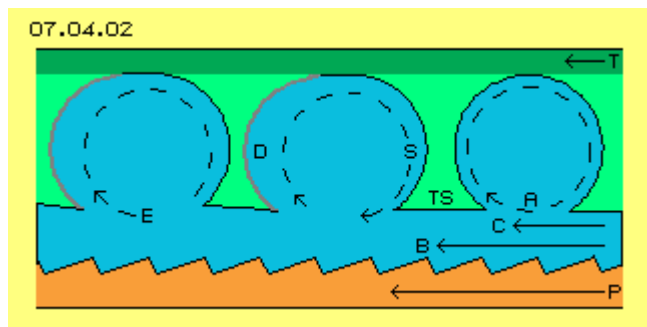


Pressure and Suction

At picture 07.04.02 schematic is shown by cross-sectional view, how mentioned meander-like movement can be replaced by that garland-like movement at machines. Within turbine T (green), turbine-blades TS (light green) build round canal and within that round hole previous circle movement A of water (blue) is turning around.

Drive respective continuous turning is affected by pump P (red), which is turning faster within space than turbine (see arrows). Based on friction, flow B near pump surface will move nearby as fast as pump. Flow-layers C further off surface will move slower, however still faster than turbine. So flows between pump and turbine keeps water rolling around within turbine-canals.

Surface of pump here is drawn by tooth-like structure, analogue to descriptions of previous chapter 'Suction-Cylinder-Engine'. Notches can be much smaller than drawn here. Within these teeth comes up circulation where water follows back-stepping wall 'by own drive'. Cylinder-like movement-pattern supports transmission of flow-layers of different speeds. That structure will hinder 'sticking-suction' and pump demands less drive force.



By movement-ahead of turbine, water within canals move at previous garland-like track within space. At middle of picture, canal is some longer, so different sections of movements at forward pressure-side D and backside suction-side S can affect separated. Water accelerated by pump flows outward-ahead and like at upside garland becomes decelerated at that phase. Water is dammed-up, redirected and delayed, flow-pressure is transferred onto pressure-side of turbine, resulting mechanic turning momentum.

Like at previous loop, water afterward is nearby stationary within space (here just upside within turbine). Again afterward, water must be re-accelerated into turning sense of system. Fast flow in front of openings of turbine-blades works like water-jet-pump. Water-particles are sucked off alongside suction-surface S, where they fly 'by own drive'. Also all water-particles tremble all time into any directions. If particle at area of opening occasionally trembles into direction of fast flow, it will disappear into that flow and thus is no longer available as collision-partner at its original location. Resulting of is general flow into 'suction of faster flow' (like well known since long times).

Thrust and Differing Layers

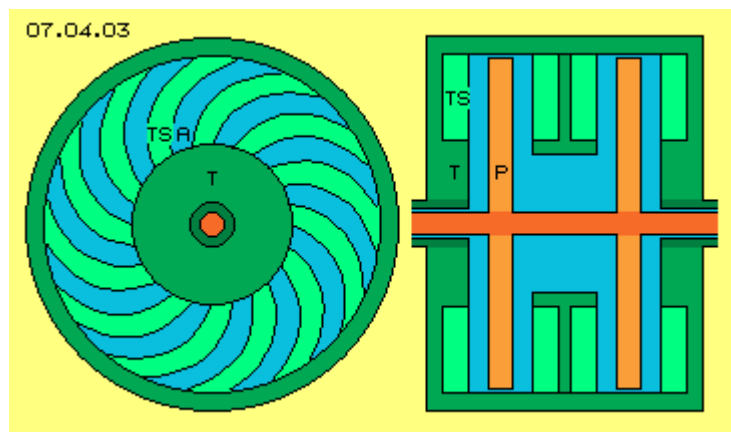
Water thus is decelerated to speed of turbine, however water will not become absolutely resting. In addition, also that water still is turning around its centre (like at A) with practically steady speed. Water entering canal alongside pressure-surface thus still is pushing water at that circled track all around.

If pressure-surface is rather rough (marked grey) different layers will come up: water direct at that rough surface is delayed, practically building 'cylinder-bearing' upon which other water-parts can move by less friction. These water-parts turn faster and fly faster alongside suction-surface S. So increased difference of static pressures at pressure- and suction-surfaces results.

Water can not follow any suction (e.g. at extreme case comes up danger of cavitation, as 'holes' appear and implode immediately), while pressure within water is forwarded at any case most direct. Here at picture now edges of turbine-blades are drawn that kind, building wide opening towards pressure-surfaces, thus for more flow-pressure. Dam-up at pressure-sides is increased resp. also speed of flows upside of previous 'roller-bearings' indirect is accelerated. As these water-parts move also faster along suction-sides, water there must not be pulled off 'resting state' but becomes integrated within fast flow (C) with less resistance.

Diagonal Canals

Picture 07.04.03 schematic shows how 'pretty nice' machine could be constructed by that principle. Right side at longitudinal cross-sectional view pump P (red) exists by e.g. two disks and at both sides are positioned each set of turbine-blades TS (light green) of turbine T (green). Turbine includes pump in total, within hollow-shaft (dark green) of turbine, shaft (dark red) of pump is turning, both shafts turn within bearing of housing (here not drawn).



Canals of turbine-blades could be arranged radial, however surface is better used if canals are bended like bows. Left side, picture shows cross-sectional view resp. view onto surface of turbine-blades. Sectors A of openings are marked blue, turbine-blades TS are marked light-green (thus its surfaces opposite of pump).

Diagonal arrangement of pressure- and suction-sides could also be advantageous concerning centrifugal forces. Water flowing into turbine is relative fast and shows corresponding strong inertia into each tangential direction. Water thus is pressed some inward at diagonal-inward directed pressure-sides and already based on constant of turning momentum additional thrust results (which at the other hand affects positive sense only by its component right angles to radius).

Water rotates within round canal, within space however water alongside suction-sides moves ahead in turning sense and towards pump. Inertia of that flow thus also shows tangential-ahead, so water will 'take-off' outwards from diagonal suction-surface resp. static pressure there is reduced once more. So diagonal arrangement of turbine-blades well makes sense.

Only Clutch or already Engine

Whether or by which size that machine is able to produce surplus benefit is open question (as long as not approved by experiments). At first, that machine works like hydraulic clutch. When pump is started, some times later also turbine will turn by likely speed. Based on friction, water is accelerated by pump-surfaces and also by friction, opposite surfaces of turbine are pulled into turning sense. At teeth-like engravings of pump-surface come up cylinder-like flows which transmit differences of speeds between pump and turbine. Some less drive forces are demanded for generating certain flow-speed alongside turbine.

If now turbine is charged by load, via friction that flow is decelerated and corresponding stronger forces are necessary for drive of pump. Same time, flow alongside turbine becomes faster and thus turning movements within turbine-blades is started. Water is decelerated at rough surfaces of pressure-sides and by that slow flow relative strong static pressure weights onto pressure-sides. If opposite water can flow unhindered along smooth suction-surfaces, difference of static pressures rises. If pump can keep that roundabout movement within turbine 'by the way', surplus of turning momentum would be possible.

That 'water-jet-pump' has to keep up sideward inlet and outlet without deceleration of its own flow-speed. Only if that's possible, surplus torque is possible, while all other forces at surfaces are neutral and all other general friction losses at first must be balanced. There is only one clear advantage of that conception: centrifugal forces can not affect negative, because all movements of masses occur at likely radius and above that, diagonal arrangement of canals represent at least no negative affecting surfaces.

Centrifugal Forces - Offence or Chance

I point out that point of view especially because theoretic calculations soon show 'gigantic power' based on centrifugal forces - and some practical experiments (with oil as working medium) soon resulted, liquid did stick 'as hard as asphalt' at outer walls and nothing else did move within machine.

I was especially 'angry' because for years I had studied inertia and centrifugal forces at rotating systems (e.g. Bessler-Wheel) and now had underestimated these effects. Inertia of solid bodies like also of liquids nothing else affects than exclusively and permanently pushing outward by enormous forces - disappearing useless into material-tension of spokes and outer walls. It's an absolute challenge to make these forces working useful.

Next chapter I will take that challenge and so this chapter here was only some introduction to problems. Previous comparison with asphalt somehow remembers at Richard Clem as he had developed his self-running car-engine analogue to an asphalt-pump. What he got done some decades before, must also be possible today.