Abnormal Physical Phenomena in Power Engineering and Prospects for Creation of Non-Standard Energy Sources”. Proceedings of the Research Conference (June 15-16, 2005, Kharkov, Ukraine). – Kharkiv: Infobank, LLC, 2005, pp. 97-121 (Ru).

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Hydrodynamic Foundations of Free Energy Physics

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Part 1[1]

Radial Stream Flow

“Theoretical physicist… is akin to a caricaturist artist who has to reproduce the original in a reduced and schematic manner rather than in all details like a camera…” (Ya.I. Frenkel). – I.e., the current theories fail to provide a comprehensive description of natural phenomena providing instead just a caricature resemblance. The aphorism by Poincaré is applicable to such theories developed by the current science: all such theories are the “truth, the whole truth and nothing but the truth”, however, they are not the “full truth”.

Let us make a deeper insight into the truth we know about the laws of the Nature.

The Newton’s third law of motion has made our physical representations caricature simple and straight. The reaction is equal to the action meaning that there is a reaction to any action. Do we really always follow the principle of an “eye for eye” and a “tooth for tooth” just because of the “applied forces” (as defined by Newton)? To which extent is such behaviour natural and efficient?

The actual processes occurring in the Nature, unlike their mathematical “caricatures’, are not always so aggressively straightforward and flush.

We kindly invite you to make your own judgement.

Let us remind the fundamentals of hydrodynamics: *any movement of a fluid is caused by inequality of the pressure at the boundary surfaces of the same. Such inequality in pressure is a driving force for a fluid*. The motion will be directed towards the less pressure magnitude [1].

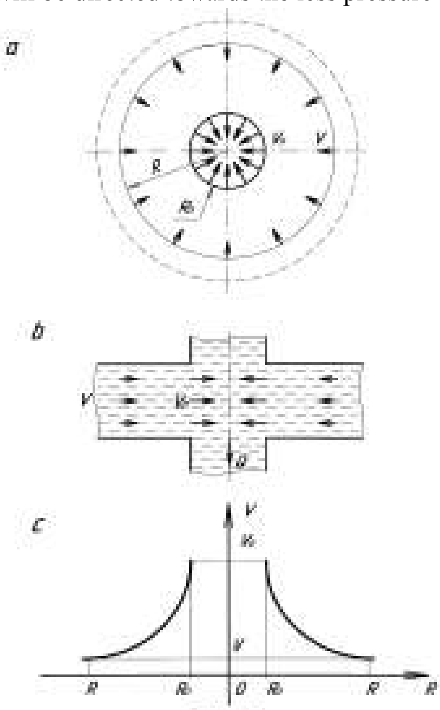

Fig. 1

In case of a flat level axially symmetric radial stream flow in an infinite hydraulic collecting channel (horizon) (Fig. 1a – plan; Fig. 1b – section) to a point on the vertical axis, the fluid velocity $\boldsymbol{V}$ increases towards the sink point in proportion to $\boldsymbol{1/2\pi R}$ (Fig. 1c). The flow is self-accelerated. This is accompanied with a reduction of the pressure in proportion to $\boldsymbol{V^2/2g}$. I.e., in this case, *an additional pressure gradient arises increasing towards the centrum supporting the original movement of fluid to the stream flow axis*. Such gradient may be described as an additional force directed inwards, to the sink point. This is an *assisting force*, and the process may be described as supported or favoured. The initial energy of the flow increases under the influence of the environment. This is a case of a *positive work*: the *velocity increases owing to the applied force, and the energy of the body increases* and accumulates. The force assists the body.

In case of a radial source, when a flow is directed outward from a point on the axis, *conversely, a negative work is performed*. The *fluid velocity* $\boldsymbol{V}$ *reduces* with a distance from the axis. Hence, the pressure *increases* outwards from a point on the axis. I.e., this is a case of development of additional pressure gradient counteracting the initial movement of fluid from the axis of the source. Such gradient may be *described as an additional counteracting force directed against the movement of the fluid* from a point on the axis outwards. This is a *counterforce*, and the process occurs with a confrontation. In such case, environment provides for an intense dissipation of the initial energy of the stream.

Evidently, in case of unsteady high-speed source or sink processes occurring with the maximum relevant accelerations, the influx and dissipation of the stream energy increase. V. Shauberger has coined the term of implosion to describe an intense inflow with a collapse of a medium upon itself in a point, whereas an explosion means an intense movement of matter outwards from a certain point. V. Shauberger has developed a series of new implosion technologies employing in his devices the influx of inflow energy [2].

What is the reaction of the conventional science community? It just draws a veil over implosion technologies having been bungled in its own theories. The described *case of a radial stream flow is an example of the action of central inertial forces*. Theorists dislike inertial forces. Inertial forces do not obey the law of equality of action and reaction. Inertial forces should be understood as reversed effective forces [3].

The use of reversed effective forces for the purposes of energy generation will be discussed in Part 3 of this article.

Conclusions

A radial stream inflow in a conservative field is accompanied with an increase in the initial stream energy.

Vortex fluid movement

O. Reynolds (1842-1912) wrote: "A fluid may be viewed as a group of warriors, laminar flow resembling march disposition and turbulent flow – chaotic motion. Fluid velocity and pipe diameter correspond to the speed and size of a group, viscosity – to the discipline, and density – to the armament of such group of warriors. The bigger the group is and the higher the speed of such group is and the more powerful the armament of such group is, the earlier the disposition will break down".

This observation by Reynolds is a very plausible illustration of the state of the art in hydrodynamics: division of researchers dealing with fluid dynamics into two antagonistic groups. One group of researchers *relay on viscosity and laminar movement considering turbulence or vortex movement as an undesirable ambiguity interfering the process*.

A prominent Russian scientist, professor A.Ya. Milovich (1875-1958) having devoted himself to the study, development and promotion of the hydrodynamics of vortex movement, may be considered a talented leader of the other group of researchers [4].

In Russia, people say about a possibility to get out of a scrape: "to whirl out" of an abruptly worsened situation.

This is literally the case in the Nature. How can a fluid conserve the absolute velocity of its particles providing for zero velocity of the penetration inside the stream from a boundary surface in case of a change in the boundary conditions, e.g., arising of a barrier or a boundary surface etc.? The fluid is forced to twist and whirl out from itself in the proper sense of the word forming vortices, swirling lines and rollers, on which the stream devolves to the boundary surface. The natural mechanism of transformation of a stream in the changed environment conditions with the stream energy conservation is realised through a helical motion.

"… Any fluid motion accompanied with the changes in the energy of the particles of the fluid cannot be stable over time. Any such motion is essentially a short-term perturbation of the motion occurring with a stable (time-independent) energy of the particles of the fluid. This is the manner, in which new stars flare up and extinguish, spots and the ends of giant vortex cavities appear and disappear on the surface of the Sun and cyclones and typhoons arise and dissipate in the atmosphere of the Earth.

However, all movements of a fluid in relation to such very active, but short-term natural phenomena do not change the basic nature of its movement determining the eternal stability of the observed pattern of the visual environment, since only those movements of fluid may be stable over an indefinitely long period of time that provide for constant energy content of its particles over time, and the integral of B. Bernoulli does exist.

Helical (screw) motion of a fluid is the only type of such movements…" [5].

A mathematical model of such type of transformation of fluid motion was first developed by a Russian scientist, professor I.S. Gromeko (1851-1889) in his work "Certain cases of motion of an incompressible fluid" (1881), however, that model was undeservingly neglected.

Professor A.Ya. Milovich went on and passed from the sophisticated mathematical model of helical motion offered by I.S. Gromeko to real hydrodynamic models and calculations of physical processes.

Let us remind the fundamental characteristics of helical motion:

1) The integral of the continuance of the energy of the particles of a fluid is valid across the all bulk fluid, $\boldsymbol{H = const}$.
2) No surfaces orthogonal to trajectories are possible.
3) The ratio of the translational velocity of a particle to the angular rate of its vortex rotation is constant.
4) Non-vortex motion of a fluid with a velocity potential is a particular case of the helical motion.

In case of helical motion of a fluid, all points of vortex lines fit the lines of fluid flow. Each particle of a fluid not only effects a translational movement, but also rotates around the axis tangential to the trajectory of the translational movement of the particle in the instant point of location of such particle.

Such rotation results in gradual shearing of layers relative each along the line normal to the translational velocity inducing the movement of the whole mass in the plane normal to the main direction. I.e., *a rotation of the stream around its longitudinal axis is induced, and the kinetic energy of such movement is exactly equal to the kinetic energy of the axial flow*. Therefore, *accounting only for the kinetic energy of the axial flow of a stream*, we *account for only a half of the actual kinetic energy of the fluid*, which eventually results in *a substantial divergence of the experimental results and conclusions of the existing theories failing to account for the transverse stream circulation*. Accounting for only the first type kinetic energy in the hydrodynamic and hydraulic applications, we generate a 50 % error and have to double the final results of the calculations in order to make such results matching the results of actual experience [5].

Figure 2 [5] shows the helical motion of fluid along a straight cylindrical pipe.

The energy conservation law $\boldsymbol{H = const}$ may be realised for a finite whirling path only on account of a continuous mutual transformation of energy: a vortex periodically dissipate its energy as a source into the environment and then, in return, absorb energy from the environment as a sink. Vortex motion in a collector with impermeable walls limiting the above dissipation (exchange with the environment) is possible only in cases when the functions of the horizontal and vertical speed components are periodical functions. In such case, according to A.Ya. Milovich, a stream flowing in the pipe is like a vibrating string.

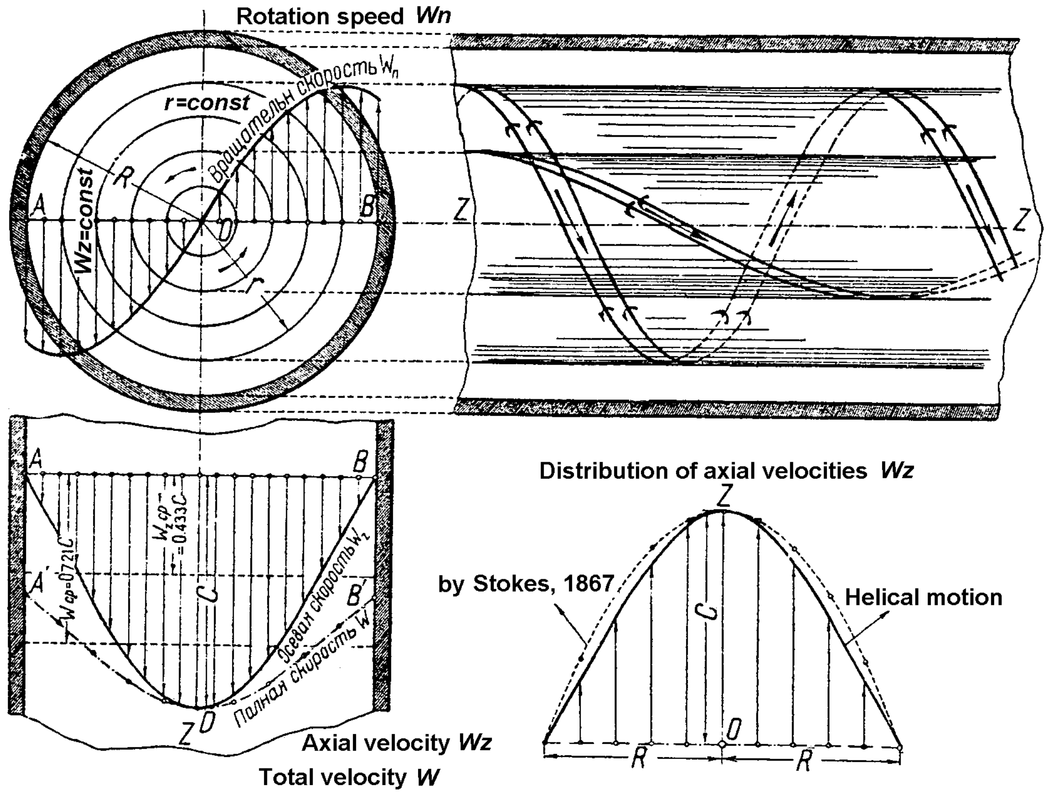

Fig. 2[5]

The theory of helical motion makes it possible to make a deep insight into the mechanism of turbulence as in the mechanism of overtones considering sound. Therefore, it is arguable that the study of such motion will really approach us to the true understanding of phenomena observed in fluids.

Conclusions

Domination of the notion of laminar flow in hydraulics and a stake on that only viscosity and friction are responsible for a head loss *have failed to account for a half of the actual kinetic energy of the transverse circulations of the vortex motion of a fluid, hence, have made it impossible to use such kinetic energy.*

[1] – Beginning, to be continued in Part 2 and Part 3 herein.

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Part 2[1]

Energy conservation at a bend of a hydraulic flow

"Straight-line motion of a fluid mass is the most rare special case of the possible fluid movements in our real environment, and in the huge majority of cases, science and engineering studying the phenomena of fluid motion deal with various modes of curvilinear motion.

Any such fluid motion may be considered a flexion or directional change in the straight-line motion of a fluid caused by the effect of certain external forces or constraint forces called in hydrodynamics limit or boundary conditions on the bulk particles of the fluid…

…Internal deformations of a liquid body caused by external deformations make it possible to provide a brand-new point of view at many phenomena accompanying the observed fluid motions having had no satisfactory explanations until now.

No additional internal circulations of the particles of a fluid exist in the single special case of a perfect straight-line motion, therefore, the area of effect of … the discovered phenomena encompasses almost all movements of fluids in the actual environment, and a failure to account for such phenomena results in almost regular divergence of theoretical results and direct experimental data.

Many sections of applied hydrodynamics - hydraulics - shall be reviewed from this standpoint" [1] (highlighted in italics by V.B.).

Movement of a fluid stream in case of curving became the "battle-field" of the ideas of Professor A.Ya. Milovich. All researches stated that a *fluid* moving along the bends of channels was *rotating*.

However, such general definition cannot be a true solution of the problem, since in the mechanics of liquid bodies, two different phenomena of rotation of fluid around an axis are known to differ with the characteristics of such phenomena: static and dynamic rotation. Such rotations are characteristic with that the particles of a fluid move along coaxial circles having their centres on the axes lying in the orthogonal planes and satisfying the equations of hydrodynamic, hence, such rotations are equally possible.

In case of *static rotation*, the particles of a fluid *do not change their positions relative to each other*. The whole mass of a fluid moves like *a perfectly rigid body* (Fig. 3[1]).

In such case of relative balance of the mass of a fluid, all particles of the fluid are rotating around an axis with the same angular rate ω. Their circumferential velocities $u=\omega r$ are proportional to their distances r to the axis of rotation and *linearly increase* by the absolute value with such distance.

In order to provide for the mass of fluid to remain in balance under such conditions, the acceleration of the centrifugal force tending to move off the particles of a fluid from the axis of rotation should be neutralized with the pressure of equal magnitude eventually resulting in the distribution of pressure along a paraboloid of revolution. The free surface of the fluid will also be a paraboloid of revolution, and such phenomenon may be reproduced via a rotation of a vessel around its axis.

Figure 3[1] shows that *during such rotation of a fluid, both the velocities of its particles and the pressure values increase with the distance from the axis of rotation, and a higher pressure corresponds to a higher velocity* similarly to the strain of a rotating solid body.

Dynamic rotation is an essentially different case.

In such case, the particles of a stream change their positions relative to each other.

A transfer from one state into another is always associated with a perturbation of boundary or limit conditions and a gradual or abrupt change in the value of pressure in a certain site on the boundary surface of a liquid

Particles of a fluid are known to circumscribe circles in the planes normal to the axis also in the case when such behaviour is forced by the action of a vortex rectilinear path coinciding with the axis of rotation.

However, such rotation of particles shall obey in this case a law just contrary to the law governing the static rotation: the circumferential velocities of particles $u=(N/r)$ are inversely related to the distances of such particles from the axis of rotation or $u \cdot r = N = Const$, i.e., moving particles follow the law of equal areas – the same Lepler's Law discovered by Leonardo da Vinci in relation to the particles of a continuous medium.

In general, different particles rotate around the axis with different angular velocities, therefore, a liquid body will be subject to a continuous deformation. Velocity distribution curve may be presented as an equilateral hyperbola. The absolute magnitude of the rotational velocity drops with a distance from the axis of rotation tending to zero at infinity.

Upon the introduction of such expression for the velocities of the particles in the Bernoulli's relation and assuming rr plane the plane of zero pressure, the distribution of pressure in a fluid will be described with the cubic curve: $(p/\gamma) \cdot r^2 = -N^2/2g = Const$, here, the pressure, having a negative value, increases by the absolute magnitude towards the axis of rotation, therefore, the actual pressure in a stream will reduce in the same direction. The pressure tends to $-\infty$ at ZZ axis, at which site, an aperture of discontinuity of flow occurs and a cavity called a whirlpool is formed.

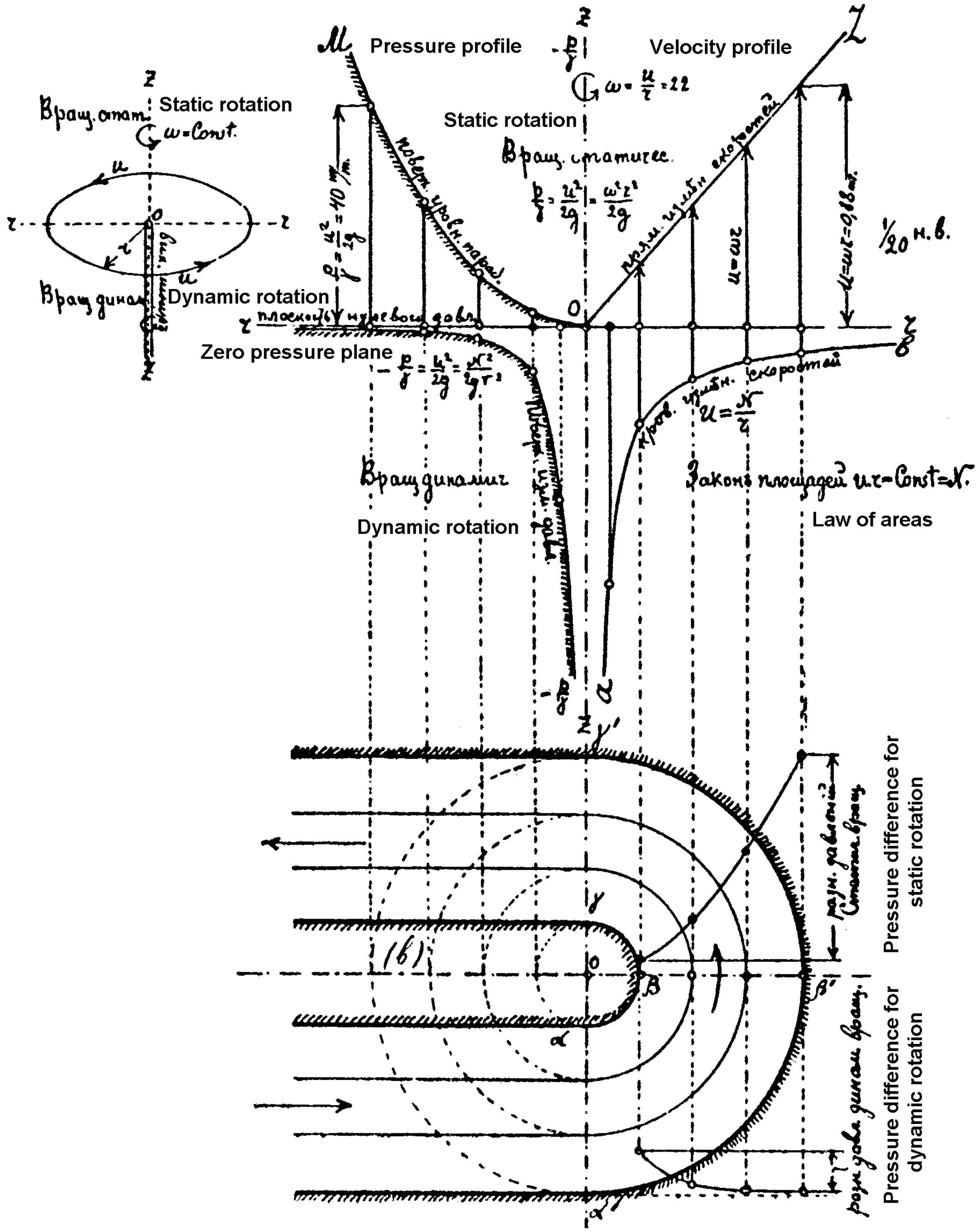

Fig. 3[1]

Such phenomenon may be generated in a real fluid via a rotation of a solid rod in a fixed cylindrical vessel in a manner when the rod coincides with the axis of the cylinder (Fig. 4[1]). Such phenomenon may be also observed in case of a flexion of a stream (Fig. 5[6]) and in case of an outflow from a central hole in the bottom of a vessel with a top tangential replenishment of fluid (Fig. 6, 7[1]) as in a cyclone etc.

The lines of pressure and velocity (Fig. 3[1]) show that *in case of a dynamic rotation of a fluid around the axis, lower pressure corresponds to a higher velocity and vice versa* as it always should be in the flowing fluid in a dynamic state.

The research works by Professor A.Ya. Milovich have shown that *a rotation of a fluid stream in case of a non-working flexion of a stream follows the law of equal areas and is accompanied with emergencies of additional circulation of the particles of the fluid in the axial plane.*

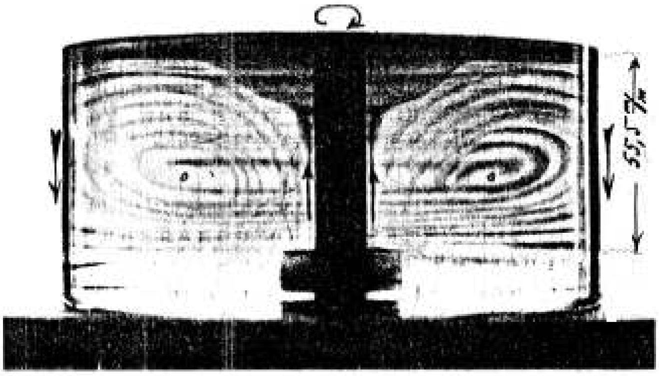

Fig. 4[1]

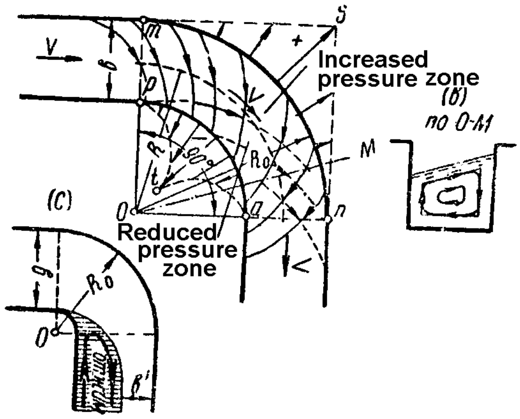

Fig. 5[6]

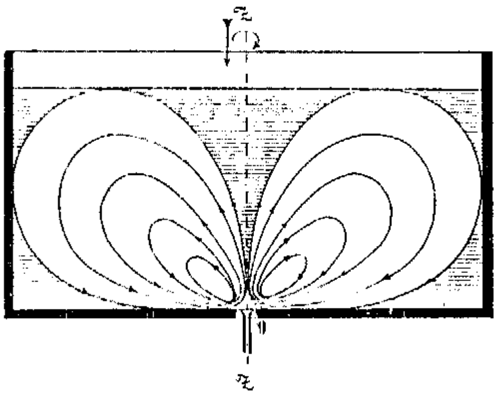

Fig. 6[1]

Fig. 7[1]

"At each bend of a fluid stream in an open channel, *circulations of particles of the fluid in axial planes are inevitably added* to the rotation of such particles around the axis of the flexion according to the law of areas.

…*Emergencies* of the movement of *circulation* may be expected on lowering the pressure in a vicinity of the vertical axis in any case of a *flexion or rotation of a fluid stream around the vertical axis*.

No additional bulk circulations of the particles of a fluid will arise only in the case of a perfect straight-line movement of the fluid" [1].

"…The fluid moving at the bottom dynamically converges to the axis of rotation, ascends along such axis to the mid depth of the liquid layer and then is dropped out to the side wall of the vessel…

Axial circulation of a fluid, having pulled the particles of the fluid to the axis of rotation, lifts them up at a high speed and then throws them back to the axis until they drop below the mid depth of the fluid to restart the described motion again, and the flow makes it impossible for the particles to leave the limits close to the axis.

This is a full and clear explanation of the action of a cyclone carrying inside birds, butterflies and other sucked in objects and keeping the same in its invisible and powerful embrace until the intensity of the cyclone grow weak" [1].

Fluid circulation in the meridian plane is a movement caused by a pressure difference. When a pressure difference causes a movement, the kinetic energy of such movement should be exactly equal to such pressure difference. Fluid circulation in axial planes increases the total velocity of liquid particles as if a liquid flow increases.

An external deformation of a stream caused by whatever reason will transform into an internal deformation increasing the kinetic energy of separate particles.

"The theory of axial circulation is in line with all experimental data. From the purely mechanical point o view, such theory is a theory of movement of a system staying under the *influence of additional constraining forces*, and only such forces may induce the rotation of separate particles around the axis following the law of areas" [1].

The resultant peculiarities of the processes of a non-working bend of a stream according to the law of areas are as follows (Fig. 5[6]):

1. In case of a flow of a stream along a curved channel, the stream, as a whole, *is moving only progressively*.
2. At the outer side of a flexion, all initial kinetic energy of longitudinal movement of a stream is transformed into the potential energy of the stream pressure. An *area of increased pressure develops at the outer wall*.

Having climbed *mechanically* on the outer wall of a bend of a channel, a fluid stream moves away from the *inner wall* of such bend resulting in a drop of pressure and forming an *area of reduced pressure* at the inner wall.

These phenomena induce a *difference in pressure at the inner and outer walls* of a bend in each axial section of the channel. Such difference in pressure induces, inside a stream, an additional movement in a form of closed circulation of fluid in the axial sections of the channel.

Therefore, in the bend site, the whole stream start rotating around its longitudinal axis, and the energy of the initial straight-line movement of the stream is consumed to provide for such rotation.

Circulation or rotation of a stream around its longitudinal axis always occurs in a manner providing for that the flow is directed from the outer wall to the inner wall of the channel (solid line) at the bottom of the channel, and from the inner to the outer wall (dashed line) at the surface of the channel Fig. 5[6]).

3. In a flexion, a *new motion of circulation* is added to the longitudinal movement of a stream along a channel and the *kinetic energies of both movements are equal, therefore, the total kinetic energy of the particles of the fluid in a flexion is equal to the double kinetic energy of the straight-line movement of the stream*.

4. Fluid movement cannot be flat in a stream flexion. The exact theory of fluid motion in stream flexion may be developed only on the basis of a helical fluid motion. In a reduced form, such motion may be approximated with a system of sucking and expulsion point source characterising the non-flatness of such motion [6].

The axial circulation discussed above consists of two repeating processes of the motion of a fluid – a source – radially thrown away from the axis of rotation of the fluid and a reverse *radial sinking* of fluid from the wall to the axis of rotation. Processes accompanied with an axial circulation are *non-working*, i.e., such processes do no work and do not consume energy of the main stream or fluid rotation. Axial circulation of fluid is a result of internal deformation of the liquid body caused by external deformations. Circulation energy generated in such case is a result of the fluid mass inertia and additional constraining forces.

Apparently paradoxical generation of additional energy during a non-working process with a conservation of the input energy, which, at first glance, falls out the general concept of conservation laws, is the main reason for a lack of awareness and unpopularity of the works by Professor A.Ya. Milovich.

Unfortunately, in this case, the scientific community shows an "ostrich-like" behaviour: instead of a detail study of the paradox – a phenomenon falling beyond the generally accepted "caricature" concepts – the scientists decide to keep the problem close paying no attention to the same. Just like it was the case with the "cold" electricity by N. Tesla, Ranke's tube and self-supporting technologies by V. Shauberger etc. However, one cannot cheat the Nature: this phenomenon has existed and will exist in the natural world. Not only the humankind, but also the Nature suffers from such "ostrich-like" policy. It is good time to change such policy having understood the natural mechanism of the binding energy.

Binding energy

What is the essence of the problem?

The fact is that according to the laws of mechanics, the total energy of a system of only conservative forces is constant. Only transformations of potential energy into the kinetic and vice versa may occur, *whereas the total energy store of the system cannot change*. In mechanics, this is called the energy conservation law [3]. I.e., the energy of axial circulation having discussed above and occurring in a real situation, cannot exist according to this law.

This is a case (that have not been described in mechanics yet) of creation of energy on interconnection of several system to form one system accompanied with the creation of binding (synthesis) energy. Such processes are well known in chemistry and nuclear physics.

Let us analyse once again our knowledge about the processes occurring with axial circulation.

- The main difference is that the *process is non-working*, and the initial energy of the movement of fluid is conserved. The process is organised in a manner providing for that "… a stream moving as a whole along a curvature or a flexion of a channel effects only translational movement having no moment of rotation around the axis of the flexion.

Thus, the sense of any internal deformations of a stream lies in displacement of the fluid mass over the curvature imposing no moment of rotation upon such fluid" [1].

I.e., a stream deals with flowing along a curvature "on its own" without any "applied forces" (as defined by Newton). It also "finds" energy to effect such process at its own means creating additional circulation streams for the purposes of whirling out of the main stream in a flexion, which provides for the maintenance of the constancy of the initial energy – "the inherent energy of matter" (as defined by I. Newton). This is accompanied with an *increase in the "inherent energy of matter", i.e. an increase in the energy upstream the flexion by the magnitude of the total energy of circulation*. Rate of such circulation flux characterises an increase in the kinetic momentum or inertial mass of the fluid.

"*The inherent energy of matter*" means its inherent *ability to maintain the constancy of its energy* [7].

Axial circulation is a *mechanism providing for the constancy of the energy of the matter* in case of deformation, a constraining force arising in response to the changes in the conditions of the environment.

Circulation is a result of a *reaction coupling between a body and an external factor. Circulation energy is an additional energy of the environment caused a deformation, i.e., a binding energy in relation to an external factor – additional constraining forces providing for the satisfaction of the boundary conditions of the movement.*

Binding energy makes us reconsider the fundamentals of Newton's mechanics in relation to the apprehension of the role and essence of the inherent energy of matter and leads to a review of priorities or – as one like to say now –

to a paradigm shift from the applied forces in favour of forces supporting the conservation of the inherent energy of matter or conservation of the energy of matter.

There is not only the law of matter or energy conservation in the Nature, but also a mechanism providing for the satisfaction of such law. How does it work?

A liquid body rotating around an axis in accordance with the law of areas (Fig. 4[1]) is subject to the effect of *two orthogonally related conservative force fields* – gravitation and central inertial forces related to each other with *reaction coupling*. Centrifugal force or inertial force of a stream has an effect on the state of a fluid in the orthogonal potential field of gravitation through an increase in the potential energy at the wall by a magnitude proportional to $\omega^2 R^2/2g$ and a corresponding underpressure (reduced pressure) in the vicinity of the axis. This, in turn, *induces* a *radial flow* running towards the *axis of rotation* along the bottom of the vessel, which flow, having reached the axis, is bounced again to the wall with the centrifugal force exerted along the free surface. This is how the axial circulation of a fluid is induced. This is the case when the energy of a gear or a stream induces, through a deformation inside a stream, a change in the field potential – reduction of the pressure at the axis and increase in the pressure at the vertical wall – instead of being consumed directly for the purposes of an applied force.

Binding energy is the additional energy of the medium created under the influence of cross grouping of potentials of several conservative fields.

Additional binding energy is created only when the process of circulation and its causes exist and vanishes immediately after their disappearing. Binding energy is similar to the bonding energy in chemistry and nuclear physics, and the processes of abrupt creation and vanishing of such energy resembles the processes of field superposition and energy quantisation.

Additional binding energy is the *energy of self-support of the process of conservation of the energy of the "inherent energy of matter" and protection of such energy from an external influence*. This energy ensures its independence and freedom, therefore, we call it *free energy*. This is an active energy being a result of a reaction to an external impact, additional constraining forces. Such notion of the free energy or binding energy differs from the notion generally accepted in the West. Generally accepted "Free Energy" means energy obtained free. In such notion, the role of the "inherent energy of matter" and its active attitude to the external stimuli are neutralised.

[1] – Continuation, beginning – in Part 1, to be continued in Part 3 herein.

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Part 3[1]

Philosophy of Free Energy Utilisation

The preceding Parts of this article have introduced the phenomenon of influx of energy and non-ordinary systems exerting such energy influx.

Energy influx of a radial stream flow on account of central inertial forces as a reaction of environment to a deformation is the root principle of efficient energy generation forming the basis for any systems in relation to the generation of energy, including:

- energy of axial circulation in case of dynamic rotation of a fluid.

We have also revealed a negative or disinterested attitude of the academic scientific community to such processes. In spite of such attitude, all such little-known sources of energy have long been used by certain outstanding scientists and researchers in the devices invented by such researchers notwithstanding the pressure exerted by the orthodox science.

The principles described in the preceding Parts of this articles, whether each in its own right or in combination, form the basis of the methods for the generation and conservation of energy.

Any case of *generation of additional energy* cannot be unnoticed – *it shall result in thermal changes in a system having generated such energy*. This turned to be true: in the end of 1920-ties, French scientist J. Ranke observed an unusual phenomenon: gas living a cyclone in the central line of a jet had lower temperature than the initial gas. Ranke obtained patents on a device called "vortex tube" splitting a stream of compressed air into two streams: cold (axial) and hot (close to the walls of the tube) [8].

Figure 8[8] shows the motion of a vortex stream in a tube with aperture (a), cone (b) and axial velocity diagram (c).

Processes occurring in a Ranke's vortex tube are similar to the processes of axial circulation of fluid in a cyclone discussed above (Fig. 6, 7[1] in Part 1 herein). Thermal changes in such tube fall within the ideas of the properties of axial circulation: The matter of a stream is *cooled down in the vicinity of the axis* of rotation *caused by a reduced pressure* (throttling effect), whereas the *temperature of the medium increases in the area of increased pressure at the walls of the tube*.

When Yu.S. Potapov injected into the Ranke's tube a stream of fluid instead of gas and further dragged such stream in order to transform the kinetic energy into heat, an energy increment was noticed in a form of an excess of heat energy [9]. *Both the energy of transverse circulation of the input linear working stream and the energy of axial circulation on dynamic rotation* in the Ranke's tube *defined the excess of heat*.

Heating or cooling is the first and most simple method of utilisation of the additional binding energy.

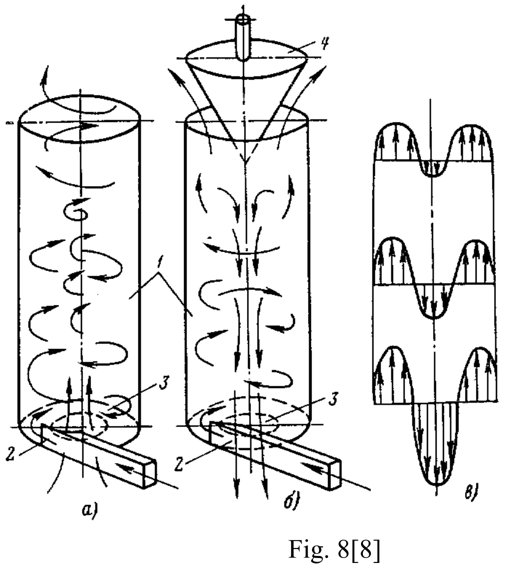

Fig. 8[8]

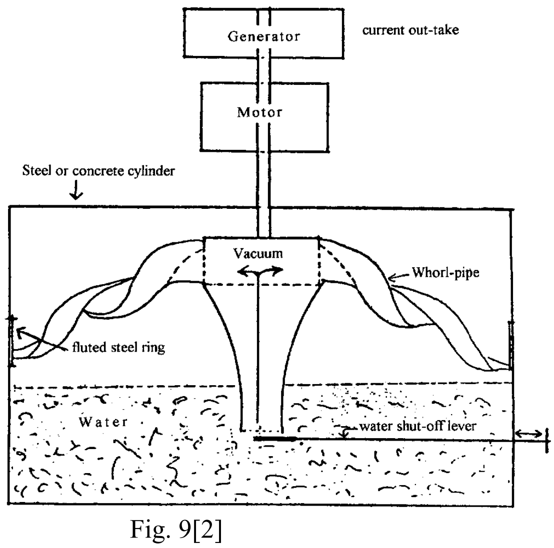

Fig. 9[2]

Axial circulation on dynamic rotation of fluid is a *self-maintaining non-working process*.

Periodic transformations of one kind of energy into another occur just because of the non-working nature of the process and energy conservation. An excess of kinetic energy obtained in the phase of radial outflow upon throwing a flow away from the axis is utilised to *increase the potential energy in the vicinity of a wall by the magnitude of the increment of the kinetic energy of the fluid* defining the magnitude of the additional binding energy. A process of transformation of one kind of energy into another provides for the satisfaction of the energy conservation law in conservative fields since the total energy remains constant in a system of only conservative forces. Only transformations of potential energy into kinetic and vice versa may occur in such systems, whereas the total energy store of a system cannot change. It is known that *potential energy* (*U*) *of a system is not single-valued and is defined* *with an accuracy of an arbitrary constant* ***U=mgh+C*** [3]. I.e., in theory, the total energy store of a system may differ with a discrete value of ***C***. Such discrete alteration of the energy of a system is consonant to the energy conservation law in mechanics. In case of rotation of a fluid around the axis under the influence of a centrifugal force, constant ***C*** is proportional to $(\omega^2 R^2)/2$.

Generation of self-maintaining free energy falls within the energy conservation law being a prerequisite of the satisfaction of this law in case of assembling of two systems in a field of conservative forces. This is a method of organisation of a high level system having higher potential. Such *self-maintaining systems correspond to the most environmentally friendly level of energy exchange and energy supply in a system*.

Free energy is an additional energy generated by the dynamic mutual influence of several coupled conservative fields (see Part 2 herein above), therefore, *such energy may be utilised only subject to the occurrence of such coupling and processes causing the same*. I.e., in the case discussed above, *keeping up with the axial circulation, we have to learn how to utilise the energy inside the circulation* without the use of external "applied forces".

A method for direct utilisation of the kinetic energy of axial circulation for the purposes of revolution of a mechanical rotor. In his implosion machine with a hydraulic (water) driving gear (Fig. 9[2]), V. Shauberger suggested the use of a *mechanical rotor having special design* for the purposes of creation and maintenance of axial circulation of a fluid inside the case of a machine. On rotation of the mechanical rotor, the fluid stream generated under the influence of centrifugal forces is injected into a special bent collector of the rotor generating a component of circulation of the stream moving from the axis to a wall. The reverse volute of circulation from a wall to the axis of rotation occurs in the fluid filling the housing of the machine. In case of such circulation, *the kinetic energy of the fluid may be utilised in the rotor area in a form of the reacting force of a stream in the bend like in a Segner wheel*. Such energy is enough to rotate a rotor in order to maintain the process of circulation and to feed a generator consuming an excess of energy for its operation [2].

A method for direct use of a reduced pressure zone at the axis and increased pressure zone at a wall for the purposes of stimulation of the process of transportation, as it has been realised by V. Shauberger in a double-helical vortex tube (Austrian Patent 134543 [2]). Dynamic rotation of a fluid around the axis for the purposes of maintenance of axial (meridian) circulation (double-helical peripheral flow) (Fig. 10 [2]) is provided by whirling the main stream inside a tube on special guide-vanes. In the reduced pressure zone along the axis of rotation, a transported material (body) is placed into the resulting spiral flow. *The velocity of transportation of matter along the axis of the tube increases in this reduced pressure zone*. Whereas the increased pressure zone at the wall acts as a backing roller. This way, V. Shauberger transported materials having higher density than the water density without touching the walls of a tube with such materials.

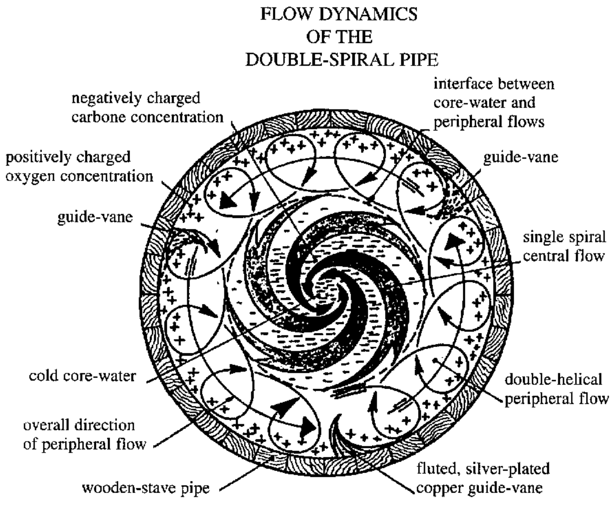

Fig. 10 [2]

The key principle of a rational technology of energy supply lies in the *use of non-working processes conserving energy, i.e. in a solicitous attitude to the available kinetic energy*.

Therefore, the existing methods of utilisation of fluid energy are not only flagrantly ignorant but also environmentally harmful. The natural kinetic energy of a river flow is damped down to zero at a dam and is transformed in the warm heating the fluid and environment and changing the climate. Arrested water increases the water level at a dam accumulating potential energy. Thereafter, the fluid accelerates on falling down from the forebay, and it is just this kinetic energy equal to the potential energy of water level difference at a dam what is utilised by the generators of a power station.

Being aware of the true processes occurring in a flow (that we have tried to show above), the use of water resources of the natural streams of rivers may be organised in entirely another way, e.g., by using a special jet turbine suggested by V. Shauberger (Austrian Patent 117749, 1930, Fig.11 [10]).

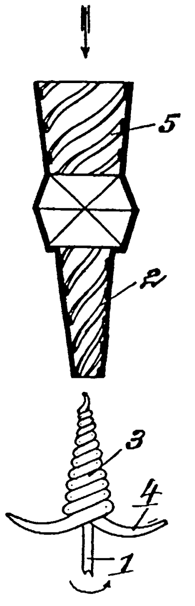

Fig. 11 [10]

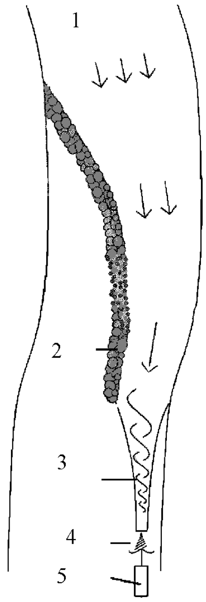

Fig 12

Owing to narrowing of a watercourse (1) in Fig. 12 with a special restricting wall (2), the longitudinal velocity of the natural stream and its kinetic energy increase with a simultaneous increase in the energy of transverse circulation of the stream by the same magnitude. Then, by using a jet pipe (special tapering cone collector) (3) having spiral ribs on the inner surface, the injected stream is whirled increasing the energy of transverse circulation and creating a zone of reduced pressure along the axis of the collector, thus accelerating the fluid flow. Collector (3) is a prototype of an aforementioned double-helical vortex tube. The turbine rotor in a form of a cone having spin-like spiralling (corkscrew-like) blades (4) is placed co-axially with the output of the flow from the collector (3). Upon the output of maximally whirled flow from the cone collector (3), tangential streamlets of transverse circulation fall on the spiralling blades of the turbine and change the direction of their movement. The emerging *reacting forces of a stream at a flexion* actuate the rotation of the turbine together with the generator (5) located on the axis of the turbine. Then the fluid, having returned to the natural watercourse restores its velocity traverse according to the inclines of the bed.

This is an example of a competent and full utilisation of kinetic energy of a natural stream, including the energy of transverse circulation of a straight-line stream.

Methods of direct utilisation of the energy of a radial sink flow.

In practice, it may be very difficult to utilise energy without disturbing the circulation. Therefore, one may use an imperfect and non-self-maintaining method providing for energy influx of a radial stream flow caused with auxiliary agents, e.g., implosion, cavitating, hydraulic impact or cumulative action etc. To realise any of such methods, *additional external conditions are required.*

Regulating the duration of a transient mode of stream flow in such systems, a condition may be achieved when the *energy influx in the phase of a radial sink flow substantially exceeds the energy consumed to generate such sink flow*.

In such case, the generation of the maximum sink flow rate and acceleration of the radial flow at the minimum energy input is the main problem.

In fact, this is the case of generation and use of a *unit super-powerful infinite circulation volute, in which the energy of radial sink flow is utilised to the maximum possible extent*, whereas the remaining energy is returned to the medium or to the initial source. Thereafter, the process is repeatedly realised via an activation of a device providing for the generation of a high intensity sink flow or medium implosion. This is a combined method requiring, unlike a natural and self-maintaining method, a regular energy input in order to be realised. Such process provides for an excess of the sink flow energy over the energy consumed to generate the stream flow, therefore, such process is called "over-unity" process having coefficient of efficiency above 1. Coefficient of efficiency is the ratio of generated to consumed energy. As we have shown above, this case can be realised with a radial sink flow in a conservative field. Same results were observed for the phenomenon of anomalously high thrust boost in a gas ejection process with a pulsed active jet; such results were executed as a discovery [11].

Such over-unity method of energy generation was broadly used in certain electrical devices by Nikola Tesla and Edwin Gray and hydraulic impact (ram-pump) and jet technologies [12] etc.

All aspects of generation and utilisation of the free energy are beyond the scope of this article, therefore, here, we schematically present only the basic hydrodynamic manifestations of such energy.

Conclusions

1. Radial sink flow of a fluid in a conservative field is associated with an increase in the initial stream energy.

2. Axial circulation arising when a fluid is moving along a flexion or rotating around its axis increases the initial fluid energy on account of the energy of internal deformations and additional constraining forces. Generation of axial circulation is a response mechanism providing for the maintenance of non-working mode of self-conservation of the initial stream energy under the conditions of the influence of external factors.

3. Understanding of the fundamentals of the physics of free energy will help to accelerate the process of implementation of the efficient systems of energy supply.

[1] – End, beginning – in Part 1 and Part 2 herein.

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