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Trench arsenal

The geometric minimum of the cold arsenal, or the surviving issue of the peaceful use of the trench tool

Content

Reason and motive for creating the concept

The topic relates to the philosophy of the history of hand-held mechanical tools and edged weapons, to Kant's question about "eternal peace" and the Fuller's distinction between weaponry and leavingry technologies.

This topic is especially relevant at the beginning of the XXI century, when mankind again faced an ideological and economic impasse, having sharply increased the volumes of solving civilizational problems by means of radical social surgery, which have the character of localized interventions. At the same time, the potential of a great many targeted, highly effective and deeply controlled, means of warfare, which continues to improve on completely rational grounds, remains. It seems crazy to not only consider the simplest mechanical weapons in the period of widely accepted and increasingly actively used, tied to single command centers, layered offensive and defense systems tied to dual-use infrastructures and including developed elements with a high degree of autonomy on aerospace, water, armored, railway, as well as personal equipment (providing for the high survivability of the combatant in very harsh conditions), but also in a sense – oppose one another. But only at first glance insane. This kind of madness has its own productivity. Firstly, if we are talking about "social surgery", then in surgery of medical proper, it is not surprising that the instruments invented in ancient Rome and in the 19th century are used in the same procedures as control and diagnostic and therapeutic agents, the prevalence of which at the beginning of the XXI century barely totals several decades, and the period of moral and technological renewal is several years. In this sense, apart from innovations like uranium cores, humanity is still fighting elementary mechanisms made of exhausted non-ferrous metals - wedges, which are shells and bullets produced by astronomical numbers of units, although the order of their astronomical dispersal using at least ancient levers and springs (albeit controlled by microcircuits), today it is very limited both by means and methods of reconnaissance and military communications, and by the socio-economic effect, produced by mass-media system. Further, not every such consideration and proposal is ineffective: the point is not only that in rocket and anti-aircraft academies they study hand-to-hand combat, including the technique of owning a

bayonet-knife, butt and sapper shovel, for quite practical reasons, but also that such a crazy installation itself is capable of being effective; of course, I mean the “crazy” Jack Churchill, who, armed with an English longbow and a Scottish broadsword, liked to talk: “Any officer who goes into action without his sword is improperly dressed”. Of course, he owned not only broadsword and bow (included, by the way, in his advanced version in the current arsenal of special forces of some countries), having arrived with this equipment in the commandos that were new at that time, and very capable of innovation. And, by the way, it’s not only that the “ancient entourage” is capable of ideologically inspiring soldiers to fight with the “eagle of victory over the battlefields” in the spirit of “bullet - a fool, bayonet - well done". The fact is that, being applied to the place, nature and order of the combat mission, these things are effective; here the skill is not only and not so much to shoot an adversary with a high-precision and super-penetrative rifle, identifying by a thermal imager through a brick wall of a meter thick, how much, using skills and knowledge about the universal principles of structuring the universe, to provide yourself with everything you need in arbitrary (sometimes quite tough) environmental conditions, being able to create means of livelihood and battle almost from scratch, organically and quickly adapting to this environment and mastering everything the advantages provided by it. And the highest achievement of this skill is that, having studied the more perfect and equipped enemy located in the same environment, master his resources using his own and gain an advantage over him (even if local). Turning to the history of military affairs, this, by and large, is a good old jaeger skill. And this skill, in my opinion, is a very worthy help and style of behavior precisely for those who prefer procedural and managerial methods for solving social problems to invasive surgical ones, especially in cases where there is an orientation to the search for such and, especially, the vision of specific means and directions.

In addition to this, it must be said that this text is inspired by the activity of one very interesting community of surviving-reconstructors in the social network, and is an attempt to answer the question of which set of tools is elementary with respect to, firstly, some, most universal, ergonomic and functional requirements for it and, secondly, possible forms, and regardless of the level of development of technologies for their production: at least with the use of machines and developed materials, even with the use of improvised things, constitute the immediate environment, whether it's even the wildlife environment.

In the course of some reconstruction discussions, ideas arose about how primary in reality even those tools that are perceived as the most elementary are. That is, is there something in the sense of tools that, in the sense of activities, other economists at other times divided to the limit for rent and labor: for all the similarities, these two types of searches are different, because, as far as tools are concerned, here we are talking about elementary organization of elementary natural forms and forces, but not about the isolation of elementary forms of adaptive human activity; that activity, whatever it may be, is applied to the general resource possibilities of that which is outside of it.

All these general considerations lead to the general question of why and how generally arsenal tools and weapons are needed, and how and how much in general we combine their trench character with weapons. In the trench sense, they are the converters of the natural environment into organization, and in the arms sense, they are the converters of an undesirable organization into chaos. And therein lies the problem of the compatibility of livingry and weaponry: organization for competition and organization for synergy. And from here - the questions about what such an elementary need in the set in order to purposefully destroy, but at the same time to be able to create. Hence, the answer is that any tool is both a means of destruction and a means of creation – the question is only in the method of use, which is a question of management. In this sense, the same specialization of the tool palette works according to the combinations repeatedly listed here. As part of the question of the elementary weapon arsenal, I have another question: how does a tool become a weapon? That is, how does livingry turn into weaponry? (And is the opposite possible?)

Arsenal requirements

Requirements that make up the specifics of the proposed arsenal concept:

1. combination of holding and propelling use of guns;
2. the combination of the instrumental function of the tool with the function of the reinforcing element of clothing (and therefore the surface of the tools should not form large and heavy bulk bulges);
3. the combination of weapons tasks using weapons with production tasks.

It follows that:

for 1 .:

- the number of simultaneously carried guns is multiplied;
- implements are made or purchased in the plural (at least in duplicate - the pair of elements ensures their minimum reservation);
- target production of tools as holding or throwing suggests the possibility of their use in the opposite function;

for 2 .:

- guns are intended as means of hidden wearing;
- valuable qualities of tools are their compactness and lightness;
- the fixation of the gun in the means of its attachment should be at least double for maximum reliability in conditions of high mobility of their carrier;
- half of the tool's functionality depends on the convenience of the means of carrying, removing and fixing it (scabbard or other fastening elements), which are universal and form a single system with the tool;
- tools for carrying tools (scabbard, covers) should assume the possibility of both mutual fixation for carrying in the form of single complexes, and separation for separate carrying;

for 3 .:

- a set of tools should embody the idea of elementary tools in various technological designs;
- emphasis in the manufacture of elementary tools is made on cheapness and ergonomics
- household, industrial and trench tools can act as weapons (the Chinese principle).

The mechanical foundations of elemental instrumentalities

Elementary in its idea, easy to manufacture and the most numerous type of tool in stock is a rod (stick), taken as a geometric element in itself - an open continuous line, not necessarily a straight line. In relation to other bodies and masses to which it is applied, the rod as a mechanism can act in two categories: a wedge and a lever, including those that perform a constructive function - for example, in triangular geodetic and reciprocal structures[1].

The difference between sharp and blunt is functional and represents the difference between the larger and smaller radii of the triangular vertex used as the working part of the tool. This means that the triangulation here is primary and corresponds to the Heron concept of the wedge.

As a basis of the stated, elementary pairs of mechanical known classics can be taken, for example:

- Heron-Leonardo wedge and lever; or
- Alberti-Palladian column (style) and arch; or
- Pythagorean-Krebs geometric shapes recti and curvi, taken as the main forms of mechanical elements.

However, despite the universality of these foundations of each author's position, it always lacks something to describe the instrumental universe. So, the wedge and lever are organic among other of the five mechanisms of Heron, which, in addition to them, include a screw, winch and block. But due to, most likely, his Platonism (which proclaimed universal ideal things, that is, close to ideas, which are unchanged), that is, historical circumstances, Heron did not include a rope or *guy* (among ordinary elements with their inherent properties known as a rope or cord), a *spring* (or an arc, or an arch, which does not have to be of a constant shape), a *rod* (working, unlike both a cable and a wedge, both in tension and in compression, whereas these first ones work either for one thing or another) , a *ring* (a closed mechanism that forms a workspace that is negative in the architectural-compositional sense and transmits only lateral vibrations) and an *eccentric* (located, if you think about it, in its classifier between the block and the winch, which performs the valuable work of relieving effort). And this despite the fact that the guy, the spring and the rod form the mechanical system of the bow and arrow, known since time immemorial long before Heron, which, according to my clarification, represents the "*bow triad*" of elementary mechanisms that are common even for mechanisms such as the wedge and lever, and which are common to all others: the rod and spring have mutually disjunctive properties, the guy used as a bowstring conjunctively combines the properties of the first two, and all three are mutually opposite. Yes, the guy is needed for the operation of the block and the winch, but it is not included in the final list of elementary mechanisms and is not considered in its *specifics* until the 20th century. Many centuries after the Greek Heron, the American Fuller did this: the "simple rope" turns out to be an amazing conjunction of the properties of other mechanisms. As for other grounds, the basic forms of Alberti concerned mainly the foundations of architectural practice and were thought of as rigid units, while the Krebsian discretion of Pythagoreanism is predominantly a geometric difference in universal forms, irrespective of their mechanical embodiment.

[1] Reciprocal and geodesic domes with rods as load-bearing elements can be considered as systems of compensated (balanced) levers with four (in some cases, like a Da Vinci bridge with three) points of attachment along the length, protruding, depending on what kind of load goes on them at the moment, points of effort, support and resistance (the general compensation of the force vectors for our three-dimensional space has found its elegant embodiment in the cuboctahedron - the Archimedean figure, invented by RB Fuller). It can be said that reciprocal load-bearing systems are systems of compensated levers, because the application of forces to their load-bearing elements is predominantly lateral.

These remarkable differences in names and facts are set forth by me in another article, here they are only indicated. More important is that all these comparisons and clarifications revealed that any mechanics exist in the universe of the three pairs of basic coordinates of being of natural forces:

- type of force direction – longitudinal or transverse;
- type of force design – straightening or rounding (opening or closing);
- type of deformation force – tensile or compressive.

All three pairs trivially testify that geometry and mechanics are a single whole (and that was one of Fuller's main emphasized ideas).

Having mentioned the most general types of mechanisms and the most fundamental foundations of the universe of mechanics, it is possible to move from them to elementary tools formed by a continuous line. Given the fact that a user function matters to them, their set cannot be an unambiguous likeness of a set of elementary mechanisms of Heron or others that he did not consider as basic - even if we assume that the former are essentially the latter.

Tool arsenal

The proposed set does not contradict Geron, but is its alternative, taking into account previously made understandings and reservations - despite the fact that there are five of them for the antique set (which roughly corresponds to the order of the five main types of deformation – tension, compression, torsion, bending, displacement). In this case, there are eight of them in the general association "2 + 2 + 2 + 2" (see below). He also extends the "bow triad" by representing each of its elements in a pair and adding a ring to it. The latter, however, has its own mechanical value, and is also necessary for representing the foundations of a pair of guys, both of which have been used since ancient times.

The main differences of this set from Heronian:

- Heronian mechanisms assume the expectation of movement as a function of the application of force to the object of influence, even if this object is another mechanism, without irreversible deformation of this object. That allows you to build more complex systems from elementary mechanisms, using the firsts as a "mechanical alphabet". In contrast, a set of instrumental mechanisms involves both displacement and deformation of the object of influence, that is, it is designed to perceive the deformation forces from the side of the instrumental mechanism. Wherein, for both sets, the irreversible deformation of elementary mechanisms is considered as their wear. And the possibility of using instrumental with objects of influence without deformation of the latter also allows you to create complex mechanisms.
- The emphasis of this set is the difference between *positive* and *negative* spaces, relative to which their instrumental function is formed. In this connection, the geometry of mechanisms is important in the presented set, especially the aspect of their topological connectedness.

Arc

Or Arch. An open curved line with a certain thickness, forming a niche. In its spring version, or open base variant, the arc represents almost the first, historically known to mankind, moreover, a mechanism with shape memory.

Able to work both on the external and internal sides:

- as the first one works as a spring (along a plane) or an arch stiffener (along a rib). When sharpened, it is a convex blade of a knife, ax or saw.
- the second one is a hook, ladle, spoon, blind curette. When sharpened, it represents the blade of a sickle, scythe, etc. items.

The specified curvature of the arc is reinforced with another arc of lesser curvature (respectively, of shorter length), embedded in it complementary and forming with it an arched, or spring, package.

Extreme types of arc:

- maximally stretched, and then represents a *rod*;
- maximally compressed or completely closed, and then it is a *ring*.

The elementary view has a "C"-shaped shape in one plane, more complex options – a "bow" recursive "S" – shaped in one plane, representing the embodiment of the mechanical idea of the sinusoidal essence of the blade[2].

The ends of the bases, the top and the slope can be workers. In sharpened on the convex or concave sides, it represents the mechanical idea of the *blade*, at the end – the idea of a *peak* (a point, by the way), optimally embodied in the form of a rod. The peak and blade embody almost the first human ability of utilitarian work with scale. (And testify to the long-standing human ability to think mechanically phenomena and essences on a inter-scale basis.).

For the case of an arc, it is possible to distinguish its axial (longitudinal) and equatorial (transverse) orders - respectively, *screw* and *radial helixes*, which obviously are springs. Acting, respectively, longitudinally-transversely relative to the axis of the arch - in the first case, and transversely - in the second.

- For a screw spiral, we have a coiled corkscrew (or hollow screw) tool, representing the difference from geronian, that, firstly, it can be formed by multiple bending deformation, as well as super-twisting, while corkscrew as geronian screw - only by twisting.
- For a radial spiral, or volute, or an eccentric spring (the eccentric itself is a rigid alternative), we have the possibility of utilitarian use as a clock pendulum spring and a snap lock (open ring) – in a flexible (proper spring) version; snail thread for self-centering lathe chuck and eccentric – in the rigid version. The radial spiral expresses the primary mechano-geometric idea of the hook.

Hooks and spirals are the main types of useful negative space formed as a worker by the inner perimeter (concave) of elementary mechanisms. Resist stretching (internal). They work on centripetal compression of the impacted object. The hook has a working end, represents the order of the lever and mainly a longitudinally working line, creating a force from the free base of the arch to its internal (concave) top.

[2] The concept of “mechanical idea” is inspired by Heino Engel's book “Bearing Systems” (Moscow, Astrel Publishing House, 2007).

Any spring can be defined as a lever with energy storage and shape memory. Including a bow as a spring, which in most cases is an exclusively radial spiral and rarely a radial spiral with a screw displacement (longitudinally-transverse spiral or a spring like a mattress or kudu antelope horn). Moreover, the design feature of most bows is precisely the task of eliminating the torque of the shoulders - that is why they are created flat or isomorphic to the tetrahedron, that is, vectorially compensated within themselves. Conversely, as useful product bow can be considered as a system that combines a spring and a lever. The simplest spring can be defined as an arched lever with a differential radius relative to a constant perimeter length. In terms of leverage, a bow is interesting in that it works with one fulcrum and two load (resistance) points, while the point of application of force is moved to another element - a bowstring working as a guy, and both bow arms work at the ends with unidirectional vectors, although the fulcrum on handle (center of the bow) works with force in the opposite direction from them. Topologically, screw and radial spirals can also be represented by bending around the other arc or rod (needle) along or across its axis.

Fuller said that the "two-triangular" (aka "double-spiral") tetrahedron is a quantum of energy, because "energy has form". The tetrahedron is formed by two opposing elementary helices. So, the arc is a form of quantum as such, that is, the archetype of any quantum.

Rod

Or a fully open (extended, straightened) arc. Also a column, style or pylon. In sharpened form, it represents a needle, an awl, a stylet, a rapier, a lance, representing the mechanical idea of the *pike*. It works mainly on the end face in compression *or* in tension. The equatorial analogue is the ring. The convex side of the open arc and the end face of the rod stretch the object of influence, resisting external compression. They have mechanics working in the geometry of the outer corner.

A rod, or style, can be considered as a compensated or straightened arc formed by two options for connecting at least two arcs - depending on whether the arcs touch each other with vertices or bases:

- ends with a loop or annular transverse coverage in the middle, or
- peaks in the middle with a loop or annular transverse coverage at the ends.

The reversibility of both versions of the rod is obvious, especially for the case when the arc has an "S"-shaped shape. The ends of the arches forming the core facing each other have a lively shape or a lancet arch shape. It is this rod that represents the idea of the Heron wedge, interpreted through arcs, and is the rod of compression. Whereas a rod formed by connecting arcs with vertices is a tension rod (column) (even if it works in compression), and represents the mechano-geometric idea of a cable guy as a tension mechanism.

In this regard, three combinations of pairs of arcs (nested convex-concave, biconvex and biconcave) form a binary base (binary-quantum, because geometrically the arc is a quantum of a circle) of what was previously designated as the "bow triad" of elementary mechanisms, two of which represent straightline objects, but ... straightline in different ways. Accordingly, these three types of arc binarity extend to the radial and axial spirals as varieties of the arc itself.

Geometrically, the Euclidean point expresses the idea or principle of the pike as a fixation in space (in fact, where this idea came from, and was subsequently criticized by Fuller). While the line embodies the idea of a thread, although it can also express the idea of a blade. However, the idea of the blade itself is more likely connected with the idea of a straight line in the simple case when the cut is carried out longitudinally, rather than straightly.

Ring

Or a completely enclosed arc. Also loop, window, fenestrated (through) curette. A closed curved line with a certain thickness, forming a hole. Mostly transversely working line. Together with the concave side of the open arc, they have mechanics working in the geometry of the internal angle. Creates a force across the inner (concave) slope of the arch. The ring can also be thought of as formed by concentrically embedded and closed at the ends of the arches-rings, reinforcing each other.

It works on compression *and* tension, that is, if compression deformation occurs in one place, then tensile deformation occurs orthogonally (according to Fuller - the plot with the "wire wheel"). On the outer perimeter it works like a disk. In the case of a minimum internal diameter, it can be a Heronian block and a winch, however, the instrumental specificity of this elementary mechanism cannot be reduced to them. The peculiarity of a rigid ring also lies in its ability to transform any vibrations communicated to it (both longitudinal and transverse) exclusively into transverse ones.

Axial (longitudinal) and equatorial (transverse) orders are also possible to describe the properties of a completely closed line representing a rigid loop or ring. For a fully closed loop, it turns out to be important whether it works:

- *along its axis*, acting as a *narrow vessel* or *tube* or *channel* (ie, a conductive mechanism), or
- *transverse to the axis* (radially or in thickness), acting as a *wide vessel*, *washer* or *portal* (storage mechanism).

As a mechanical element, tubes are important for carrying out not only liquid or bulk products, but also cables, acting as the rods of Snelson-Fuller constructions (tensegrity or "float compression" systems). By the way, the process of forming holes by drilling soft materials is a sampling of the positive space in the form of both helical and volute, spiral chips, regardless of whether the drill itself has a spiral shape.

In the case of interpreting the ring as the continuously connected ends of the arc formed by nested arcs (at least two), whose vertices are on the same axis, we obtain an asymmetric torus (closed crescent) structurally corresponding to the elementary hydrogen atom of de Broglie in the interpretation of Snelson in the article "Story of the Atom "(one of the most noteworthy points of this article is a quote from Whitehead as an epigraph that is well suited for this work). So the ring is not necessarily uniform in thickness, and can also be formed by embedded arcs in various ways - both parallel-concentric and with radial displacement of the inner rings relative to the axis of the outer to the inner side of the latter.

Topologically, the ring can be represented by perforation with the tip of the ring or rod along the axis, while the blade forms:

- longitudinal cut – from the tube to the gutter (in the case of some materials, the ends of the "C"-shaped arc are folded into two connected tubes);
- transverse cut – from tube to ring;
- transverse cut – from a ring to an arc (in the case of some materials, the ends of a "C"-shaped arc are folded into two connected radial spirals or one screw);
- longitudinally-transverse cut along the axis – from the tube into a spiral spiral;
- longitudinally-transverse cut across the axis – from a ring with a minimum inner diameter (disk) into a radial spiral.

Guy

It presents the opportunity to variably create useful *positive* and *negative* spaces formed by the *positive* space of its structural level, without form memory. The set of the internal arc by the mechanics of its elements makes it possible for the cable-staying mechanism to exist in its two main forms: a continuous twisted rope and a discrete chain link. But the guy herself cannot be reduced to them, because it is different from them by the variability of form and formed diameters. In the nodes and girth of other mechanisms, it is able to form a working external arc, and since it is a mechanism with a variable radius, it provides both tension in an open line and compression in a closed line of a node or loop, acting both longitudinally and transversely, and resisting longitudinal and transverse stretching.

"Hook order"	**"Ring order"**
Rope	*Chain*

Geron's lever is a mechanism without the accumulation of energy in an element (which, in fact, it is), but which immediately performs useful work with energy. A guy can be considered as a lever with maximum transverse ductility and adaptability to support curvature (because the very concept of a fulcrum is an abstraction of the curvature of a negligibly small radius).

On weapons in the sense of an arsenal of "two arcs"

The main types of weapons known to mankind since ancient times are mainly “external arcs”, with rare exceptions, which are characteristic, perhaps, of Asian edged weapons, among which are known blades with internal curvature, perfectly reflecting the ability to think of forms in the categories of positive and negative spaces according to fundamental oriental duality (Chinese shuangou and "deer horns", Japanese kama). However, in general, historically initial and, at the same time, simplest types of cold steel, and hence weapons in general, are reducible to three pairs of solutions, each element in which corresponds to a "wedge order" (and axial asymmetry) and a "leverage order" (and equatorial asymmetry) - even if these solutions are not strictly bladed, but “impact-crushing”. Despite possible accusations of reduction by connoisseurs of broader classifications of known historical forms, I still venture to present the following as a basis - all the more so, given the above, it essentially does not contradict them:

- with a short working part ("short-blade") – a dagger and a knife;
- with a long working part (“long-blade”) – sword and saber;
- with a long hilt part (“poles”) – spear (lance) and ax (club, hammer, mace, knobstick, etc.).

All other types of cold weapon are somehow derived from them. The middle one stands out from these pairs – first of all, in that the sword and saber, one way or another in history, were premium or elite types of cold weapon or the overall development of the first pair. Whereas the third pair is in one way or another a distant increase in the first – respectively, rod or lever. Moreover, it is the first and third pairs that are, perhaps, the most technologically most elementary forms, whereas those with a “long working part” are an intermediate solution, which is precisely due to this “combination of extreme” product innovation that gives a specific functional advantage - as evidenced by numerous examples of the development of straight and curved blades of Europe and Asia - the Spanish epee and rapier, the German grossmesser, the Polish berdysh and the konchar (to the extent possible talking about the Polish chopping weapon as "originally Polish" as specifically European, but not Asian) and other things. From the point of view of technological efficiency, conceivable as a parity of the effectiveness of the function and low cost of production relative to the prospects of construction and materials, the first and third pairs are certainly optimal.

Examples of instrumental-based kits

A special case of what we are talking about here are hunting, camping trench and serving, as well as weapon-combat toolsets. The standard or statutory version of the latter for different eras, cultures, and states is represented, as a rule, by one pair of “external arc” guns, one of which is a means of long-range combat radius (spear, rifle bayonet, berdysh), and the other is of near radius, which is auxiliary (dagger, ax or hatchet, saber). This also includes the samurai set of kendo-style daiso, using only the outer arc; caucasian dagger with a smaller dagger knife relative to its size. In contrast, the use of cables and hooks (including blades that are used mainly with a concave perimeter) is noticeable in the military kits of the ninjutsu and iaido schools, while the outer arc is represented mainly by straight stylet guns.