*ILUIL*, vol. 24, 2001, 449-472

# THE RESEARCH OF THE REPRESENTATIVES TYPES OF "*MOARA*" (THE MILL) WHICH WERE IN FUNCTION IN THE CARPATHEAN-DANUBEAN-PONTEAN SPACE FROM PRE-HISTORY UNTIL CA. 1825. SOME RELEVANT TECHNICAL-TECHNOLOGICAL, HISTORICAL, ETNOLOGICAL, PHILOSOPHICAL, MUSEOLOGICAL ASPECTS. EXAMPLES.

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*An homage to memory of señor José García Diego y Ortiz, founder of Fundación Juaneleo Turiano, in Madrid*

*RESUMEN*

*Un análisis con muchos casos, de «Moara» —i.e. el molino— en uso especial en Carpático-Danubio-Pontico territorio en un gran periodo histórico —de la Antigüedad a mediados del siglo XIX.*

*ABSTRACT*

*In this study an analysis of the «Moara» — i.e. mills and millings—, used, specifically, in the Carpathean-Danubean-Pontean Space during a long and relevant row of centuries is made. The complexity of the concept of Mill and Milling is expressed by presenting different relevant types and uses considered on the basis of different (technical, economical et al.) criteria.*

Palabras clave: Técnica, Transferencia Tecnológica, Sur-Oriente de Europa.

*Recibido el 11 de enero del 2000* *I.S.S.N. 0210-8615*

## I. Argumentum

From very remote time men, living in various societies, have used[1] many substances useful for their material & spiritual needs which where prepared in multiple manners in such *modus*-es that the final products of these technical-techno-logical products became useful goods, —technological status achieved after some various processes of «*fragmentation*»[2] of initial substances.

We name, *in aesentia* and *latto sensu*, these kind of technical fragmentations «*millings*» and the artefacts (systems: with installations, devices, et al)[3] by the means of which clever technicians has realized these operations «*mills*»[4].

In the Carpathian-Danubean-Pontean Space (C.P.D.S.) the mills *stricto et latto sensu* were known[1] in many representatives *situs*-es & regions of this well determined geographically-historically area. We name these technical systems, generally, with the name «*moara*»[5] —name which designate a paradigm a—; these physical-chemical-biotical-social systems are, frequently, entities with rich «pallete» of properties which emphasized the complexity of different millings.

For the understanding the meanings of the complex concepts «*Moara*» (the *Mill*) and «*morar*-it» (the *milling*) an epistemological-methodological-praxiological-axiological analysis is necessary.

The meanings of the mills —species of the "*Moara*"(«the Mill»)— with they social applications —«*mor?r*-it» («millings»— are determined in different (intimately connected) frames of reference:

a. With regard to the physical agents[6] which produce the motions of their specifically installations: the forces, the pressures, the energies (kinetic, potential), the powers, the entropies, the efficiencies (physical, technical), the synergies:

a.1. Human physical-chemical-biotical forces[7].

a.2. Animal forces: of horses, of oxes, of donkey, et al.

a.3. Natural simple-technicized forces: mechanical (gravitational[8], et al), hydro-dynamic (of currents of running water, main-forces[9], tides[10,11] et al), aero-dynamics (winds; et al).

a.4. Natural complex-technicized forces: tieds (hydro-gravitational forces)[12,13,14], heat (mills with steam engines)[15], electricity ("*fire-mills*[16]: *mori de foc*).

The milling-technologies were used also efficiently in other technical activities[17,18].

b. With regard the technologies used for achieving some well defined social technical-purposes (one-goal, several, mixed mills).

c. With regard the social activities developed in diverse mills: which are considered as institutions localized in the spaces occupied by the systems of artefacts named also mills[19].

The evolution of the «*Moara*» and of its uses – the Milling – in C.P.D.S.[20] i.e. in this matrix of culture & alveolus of civilization – is extremely relevant and can be drawn in its essential aspects and interpreted in adequate *modus*-es by taking under considerations:

a. Some archeological remnants: (relatively) very old/old fragments, vestiges (*in integrum*/partial restored/reconstructed).

b. Some historiographical recorded information (written, oral, et al: descriptions, mentions).

c. Some conserved artefacts: preserved[21], restored (*in parte, in integrum*) *in usu* in diverses *situs*-es, in museums (fosilized; *vivum*) [8] [9] [14] [61] [65].

d. Some reasonable (pertinent, plausible) conjectures and arguments: hypothesis, comparisons of types, verifications, *scenario*-s, coroboration of information, deductions, extrapolations in historical *Tempus* (in the relative-past: retro-vision; in the relative-future: anticipation), extrapolations in *Locus* (in some quasi similar cultural-civilizational axiological conditions), extrapolations in space-time (in *Locus-Tempus*).

## II. Types of «Moara» defined by the social uses of these technical-artefacts

We consider *in aesentia* in the following the types of «*Moara*» which express the rich technical culture & civilization (folk; et al) developed *in curriculum Historiae*[22] in the C.P.D.S., presenting in each cases also some relevant conserved important artefacts personalized by some features/interesting origins (original forms, «technical principle» of function, important components, social aspects, et al) [1] [2] [8] [9] [13] [29] [45] [46]:

1. «Mills» used only for pressing some utilitarean not very hard materials (resin, wax, soils, cloth, papers, et al)[23].
2. Mills used for hulling, grinding, crushing some non-cereal vegetables[24] (hemps, grapes, plums; the *lin*).
3. Mills used for making flours[25].

This kind of milling was —throughout the archaic, antique, medieval, immediately post medieval History of human civilization— the domain of technical-activity that proved to be the most receptive to new inventions-inovations[26] in:

a. The area of technical-kinematics: of motions, of transmitting various motions in/through specific systems.

b. The area of technical-dynamics: of power sources.

The mills and the millings are, together, a relevant technical, civilizational & cultural marker for the sedentary agrarian civilization developed through the ages from the Neolitic (revolutionary) era to the Steam and Electricity era.

The durability of the mill-stones and the important consequences of flour-millings for men living in organized societies has essentially determined the possibility (dear and relevant for the researchers) to follow the way in which this kind of technique-technology, expressed by remarkable functioning artefacts was developed *in processus curriculi Historiae* [1] [2] [29] [45].

The many archeological discoveries that were made on the territory of C.P.D.S. are, each one and together, faithful witnesses of the historical evolution of «*Moara*» (mills, millings): they reveal the importance of autohtonical genesis and of the civilizational-cultural contacts with the civilizations-cultures of the Greek

and Roman Antiquity which influenced the entire huge area around the Mediterranean Sea during many centuries:

a. The pre-classical Greek period[27,28],

b. The classical Greek period,

c. The Helenistic period,

d. The Roman period, especially when most of the fundamental types of mills and millings are generalized[29]:

d.1. The quern: hand mill,
d.2. The animal-powered mills: with direct transmission,
d.3. The water powered-mill with direct transmission,

d.3.1. On the oriental type: with horizontal wheels,

d.3.2. On western type: with vertical water-wheel and multiple gearing. The water-mills were known in Dacia, at least in the towns (*municipium*) and administrative centers (*urbs*, important *vicus* et al.) and the highly developed technology of these mills is clearly proved by:

a. The existence of a lot of mill-stones discovered by the researchers in this large area, vestiges which are similar to those discovered in another part of the huge Roman Empire.

Ex. At: Sarmisegetuza/Ulpia Traiana, Napoca, Micia, et al. [27] [28] [38].

b. The existence of a diversified, rich, specific net of rivers of different magnitudes in Dacia: and, *in consequentia, 'tot aquarum tam multis necessariis molibus...'*

c. The Latin terminology of the most important technical structures of some mills (hand mills, animal powered mills, water powered mills), which proves that these installations were continually used by a native population throughout the first millenium, long period of historical *Tempus* in which some of these archaic technical-items even were improved (in technology, in technical items).

d. By the non-latin later terminology: which express the fact that when the important population of Slavs settled on the North of the Danube and became (here) sedentary in such an extend that many members of this tribes took up farming and, in this new conditions the Slavs took the improved installations from the natives, and

they give to some of them Slavic names - names which were assimilated during the early Middle-Age centuries by the native population; and also later when the process of evolution of the «*Moara*» (flour mill, flour milling) had been completed [28].

Ex. The Romanian names of Slavic origin: *rîsnita* (grinder), *pîrparita*, *cring*; et al.: these names express technical types (variants) of mills but not relevant concepts, or important actions.

In middle-Middle-Age —between the X – XIIth centuries, in the frame of feudal constituted society[30]— the water-mills became wide-spread and the flour-milling turns into an important industry.

a. A monopoly of the great lay and eclestical landowners and of the ruling princes;

b. An industry in which were involved (directly; indirectly) many peasants: serves, consumers, productors of raw materials;

c. An industry which, later, also some peasants of villages slowly manage to acquire of their own too: water-mills, other hydraulic installations and farinaceus produces of millings[31].

In the XIVth century, and later, it was introduced in some areas of C.P.D.S. many huge horse-driven mills in which this kind of animal-powered systems were relevantly improved[32].

In the XIVth century, and later, it was introduced in some areas of the C.P.D.S. a number of wind-mills.

Thus, the «*Tehnica molinaria*» was impressively completed.

The researchers of the evolution of diverse species of (flour) mills has put in evidence the existence of impressive diversity of this kind of Mill and different (flour) millings —i.e. of *Moara* (*de f?in?*)— in the considered area, some items being recorded in various historiographical and literature (oral, written) documents, a certain old artefact being conserved.

In C.P.D.S. the flour-milling was developed in such an extend and qualitative manner that a certain features of this specialized folk technique-technology were specific:

a. The water-mills with horizontal positioned wheel were wide speared: in the considered last past period of *Tempus* there were in some sub-areals not few villages in which up to n ª 30 ñ 40 such water mills strung out like pearls on a necklace along one or two water courses.

b. The local hydro-dynamical peculiarities of water-courses and of other natural agents were taken in account with great ingeniousity which led to the extraordinary variety of types and variants of mills attested historiographically.

c. The specialization of some whole villages in the building, trading and using of various types of mills —water/wind/horse driven mills— meeting the demand of many not small neighbouring areas is an evidenced fact.

Ex.1. In 1585 the French traveler François de Pavie mentioned the existence of the wind-mills in Dobrudja: with 4-6 sails; these eolian engines existed in this area until the beginning of the XXth century.

Ex.2. In the XIVth century is mentioned the use in some (southern) parts of the C.P.D.S. of flour-mills driven by horses: these animal-powered engines are mentioned in a Notarial Register from Genova (draw up in the town Chilia on the North branch of Danube Delta in 1366-1361).

Ex.3. In the XVth century, in the time of the reign of Voivod Stefan cel Mare the mills made from the gut stone from Hârlau were reputed (inside; abroad).

Ex.4. In 1793, November 27, is made the first historiografical mention of the use of mills driven by horses in Tara Românească: in an act of the Voivod Alexandru Moruzzi (1793-1796) is decided that 14 monasteries in Bucharest must install such mills.

Ex.5. In 1812 Moldova and Tara Românească were important exporters of mill-stones made of silicon grit stone.

Ex.6. The underground flour-mill from the neighborhood of the village Miscu (*judetul* Teleorman): a. all this mill is hidden in an underground space, it is (probably) a very old artefact (made in «trouble ages»: *vremuri de izbeliste si de*

*bejenie*: late Middle Age, or posterior ages); b. the technical-units contain two grinders (*macinatoare*), fullons (*pene*) by which were introduced the seeds, recipients, horizontal stones articled (horizontally) to a vertical sharh (axle) thrust in the ground (*podeaua*) of the under-earth-building; the extremity of the axle (*protap*) has arrived upper the surface of the earth and was provided with a lever with a long hand to which could be harnessed animals (horses, oxes, mules); c. the system was driven by men and animal power; d. the building is a *bordei* (under-earth hut), with *gîrliciu* (cellar); the house of the mill engraved in the earth of the plain (*Câmpia Român?*) was «camouflated» by grass, herbs, bramles[33].

Ex.7. The villages Gura Rîului, Orla?, Rîu de Mori et al. in Transylvania were reputed by their handicraftsmen builders of mills *in integrum* or milling instalations.

Ex.8. Certain villages in Walahia, such as C?scioarele, were reputed also for shipping good made milling installations, as is attested by many mentions made during a row of years in the Ottoman Empire's Custom Register for the late XVIIIth century in which is recorded the exporters of mills and of another technical «machines», installations and devices to the Turkish Empire: in these archives some millers of this village were appreciated as exporters of floating mills.

d. Some mills conceived, built and used by ingenious Romanian *magister naturalis* have some original components: the reputed elegant and (relatively) convenient «*Moara cu facaie/ciuturi*», i.e. the mill with spoons[34,35,36]; the function of these mechanical technical-units are ensured by: the plane wheels having carved in their structures several wings spoons (*cause: facaie/ciuturi*), the pipe for the water adduction (a *jghiab*: wooden through; with different sections in the entrance and in the exit), which permit in admission a relevant transport of kinetic energy of the permanent running continuous fluid shocking (intermitently) the escavated part of the «*facaie*» (very near; one to another: organically connected in the structure of the rotor; passing in their rotation in a relative strong and regular hydraulic flux); the structural components are (articled) means adequate for achieving specific functions [(captation, adduction, accumulation, admission, generation of rotational motion of the axis (axle: shaft) of the mill-wheel, direct transmission (*via axis rotae*) of this motion to the massive stone which became an extended source of active force able to produce (efficiently) the fragmentation of the seeds introduced in the «active zone» of the *machina*]; these functions were in such an extend efficient that the biotic «drops», i.e. granules with organic comestible substances, became at the end of milling process the comestible powder named *faina* (*farina*; flour). These components and their functions organize in a harmonized, simple ensamble, defines the complexity of this picturesque «*machina mirabila*».

Ex.1. The water-mill with horizontal wheel from Tople? (*judetul Caras-Severin*).

Ex.2. The water-mill with «buttons» from Svini?a (*judetul Caras-Severin*): it dates from the late XVIIIth century, it was recorded in the Austrian land-register with the name «*novana*» given by the villagers because at its edification it was an architectonic novelty being constructed of stone-masonry instead of beams.

Ex.3. The water-mill with two dip buckets and belt-drive from Rîu de Mori, Hateg district (*judetul Hunedoara*).

Ex.4. The water-mill with three horizontal wheels from Arcani (*judetul Gorj*).

Ex.5. The water-mill with 6 horizontal wheels from Galesoaia, Cîlnic district (*judetul Gorj*).

Ex.6. The water-mill with under-shouted wheel from Dobîrca (*judetul Hunedoara*).

Ex.7. The water-mill with under-shouted wheel from Poenii de Jos, Buntesti district (*judetul Bihor*).

Ex. 8. The water-mill with over-shot wheel from Orsova, Gurghiu district (*judetul Mures*).

Ex.9. The water-mill with over-shot wheel and drive system in two steps (i.e. with accelerator) from Rogojelu (*judetul Cluj*).

Ex.10. The water-mill with over-shot wheel from Alma? S?li?te (*judetul Hunedoara*).

Ex.11. The floating mill from Lucacesti, Pribilesti district, on Some? River (*judetul Maramures*).

Ex.12. The floating mill on Olt River from Munteni (*judetul Vilcea*).

Ex.13. The floating mills with *dube* on Nistru River, from many places: from Dubasari, et al.

Ex.14. The small wind-mill with stone socle, from Enisala, Sarichioi district (*judetul Tulcea*)[37].

Ex.15. The two-storeyed wind-mill from Dunavatul de Sus, Murighiol district (*judetul Tulcea*)[38].

Ex.16. The two-storeyed wind-mill from Frecatei (*judetul Tulcea*).

Ex.17. The wind-mill with sails from Curcani (*judetul* country Tulcea)[39].

Ex.18. The smock-mill from Bestepe (*judetul Tulcea*)[40].

Mills used for processing some utilitarian (relative) hard materials: woods, stones, metallic ores (gold, silver, cooper, sulfa, irons, steels, allois);

4.1. The press hammers human/animal/ water driven technical systems.

4.2. The saw-mills on animal-powered, or on water driven powered, or on water driven technical systems.

4.3. The crushing mills used in stone careers for making boulders, coals, graves, sand.

4.4. The ores-mills water powered are very interesting: in the Rodna area (N?s?ud county), in the Maramure? area (Baia Mare; in some trans-Gutin mountains zones), in the «gold-square» of Transylvania[41] (in the western Carpathian mountains: *Tara Motilor*)[42] were introduced some systems in Antiquity (in the Dacian epoch, in the Daco-Roman period)[43], and also later (in the second part of Middle Age; in Renaissance); in the XVIIIth century, when Transylvania was a province of Austrian Empire, were introduced[44] (relative) efficient running-mills [named *stemp-mühle, [teampuri*; some original (local) inventions - which produced economy of water, of energy, of human work et al. are recorded: they were made by the peasants (in servdom) Idu, Palade, et al.) [2] [13]; were used specific auxiliary tools].

4.5. The mills used for the preliminary remake of rought rocks: the dislocation of rocks containing (in different degree) useful materials were made by the miners with specific mining tools, bore-machines, pick-axe, hammers, saws, explosives[45].

4.6. The mills used for the metamorphosis of some utilitarian metallurgical products: adequate tools (*hamore, vereie*).

5. The mills used for remaking textile fibres and textures are various and relevant

a. the wheel pools: *steaza*[16], *vâltoare*;

b. the spinning of textile fibres: *furci, fuse, fuioare, caere*, et al.;

c. the water driven fulling mills: *fulonica*[17], *pîrpîri?a, dîrste.*

The use on a (relative) large scale of water driven textile installations and procedures for processing textile materials has generated some important (social; economic; ergonomic; technical) *phenomena*:

a. Has contributed to the substantial increase of textile-production (wool; et al.);

b. Has influenced the trade of textile (wool; et al): the major part of the huge productions (idem) were sold on various markets (in Transylvania; abroad; in West and East directions);

c. Has influenced the sheep-farming: it was generated a complex process of transition from the primitive quasi-autarhical local system with wintering in the village to the phase of pastoral trans-humancy which was developed and became an extensive system of raising extended (in the trans-Carpathian areas: Banat, Dobrudja, in North Balkanical areas, in Basarabia, trans-Nistria, South of Ucraina territories);

d. The direct beneficiaries of these advanced hydraulic textile installations have obtained important incomes: which were put in social value in diverse manners; d.1. an important part of these incomes were ploughed back by the sheep farmers for the development of their own households, and for their villages (rural institutions: schools, churches, associations; roads, communications; et al); d.2. a non-negligeable part of these incomes was used for some investments in non rural economy (business, commerce, small industries; for cultural national actions).

The development of centers of textile industry (traditional; with new methods: patterned on the models that had been already introduced in some town) is noticed by many historical documents.

e. The other beneficiaries of these performant used installations (from rural, semi-rural, urban et al. areas) were the consumers of the textile products (cheap, of good quality, in satisfactory quantity) and the persons (idem) in contacts (in several forms and degrees) with the prosperous wool and/or cloth producers, and with other active men of fulling-mills industry.

6. The mills used for prepare utilitarian substances derived from paper; the history of this kind of mills is also relevant but we cannot present here the recorded aspects.

The intellectual and emotional contacts of men with this «*teatrum machinarum molendarum*»[48] imbued the sensitive persons with the feeling and the idea that it is a sacred duty for them to collect, safeguard, retrieve, and honor the material proofs of the history of Romanian civilization & culture achieved by the honored fore fathers. These human energies —feeling and idea— generate motivations which, finalized by actions, enforce the cultural identities, allowing (adroitly) a warm (but not harsh) current of patriotic pride, an elogee to the age-old wisdom of Romanian people embodied in these veridic and unique things[49].

## III «*Moara*», a relevant institution of civilization & culture of C.P.D.S.

This function of the mills is illustrated by an extremely rich literature[50], and by axiological aspects[51] put in evidence by sociological studies [24] [60].

## IV. Some relevant conclusions

The characteristics of «*Moara*» (Mill, Millings) investigated by archaeologists-historians, interpreted by philosophers demonstrated in a peremptory manner the truthfulness of a splendid bunch of fundamental ideas gathered in by the creative «*fortitudo Historiae*»: forces of History.

a. The antiquity of mills and millings in the C.P.D.S.: which express the postulate that only the sedentary social *modus vivendi* achieved with permanent (conservative, creative) practice by important groups of men living together without discontinuity *seculum et seculum* can generate a civilization & culture so proficient in skills, abilities, methods, procedures, traditional tools, implements actualized in aquisition from *Natura* of its vital resources and in their diversified efficient processing in order to meet satisfactory some of the fundamental necessities of life.

b. The continuity of residence of the Romanian people in the C.P.D.S., cradle and home during centuries, alveolus & matrix of a consistent civilization & culture.

c. The propensity towards civilizational & cultural dialogue of Romanians and of other minoritar peoples co-living —(in specific conditions; organically connected, with multiform material[52] & spiritual relations, with some pecularities, transformed *in processus Historiae*: ancient, medieval, more recent)— in the C.P.D.S. with other relevant communities (active by their creators and producers of civilization & culture[XVII]).

d. The complex influences and dialogs initiated and upkeep *in curriculum Historiae*[53,54] in the relevant case of «*Moara*» - i.e. in the conceiving, projecting, constructing, using of various mills - between the Romanians and the minoritareans living in C.P.D.S. and other relevant external communities were produced important social consequences (material, spiritual) which have enriched (without altering) the essential (spiritual) originality of their own civilization & culture[55].

## NOTES

1 Specifically: principal, relevant, secondary, noticeable, strange, et al.
2 And another geometrical-physical-chemical metamorphosis.
3 Physical-technical-technological systems: machines, engines, installations, aggregates, tools, devices, pieces, ..., annexes, ..., services.
4 Special fragmentation of different materials are produced also in the XXth century (in the Era of Electricity, of Atom/Nuclear power): sofisticated washing, centrifugal and electrical separations, decompositions (distilleries, electrolyses, spectrographs of masse, separation of isotopes, accelerators of micro-particles in function at extremely high energies, colliders), et al.
5 In Latin: molina, in Spanish: mulin, mulinos, in Portuguese: mulina, in German: M¸hle, M¸hler, in slavic languages: mlin, melnic, in Hungarian: malom, moln·r, in Greek: milos.

6. Impressed by standardized physical magnitudes and relations [12]:

$$F=ma,\ p=F/S,\ E=Fd,\ E=E_{cin}+E_{pot},\ E=L+Q,\ P=E/t,\ S=\int d\ S=dQ/T,$$

$$\eta=E_{used}/E_{consumed\ (from\ Natural,\ from\ Men)}$$

7 Unconscious – Conscious.

8 Weights of different terrestrial objects: a form of Gravity.

9 In diverse pipe-lines: tubes, trough (*troci, jghiaburi, copai, conducte*).

10 Determined by the universal Gravity, i.e. by the universal attractions: of the Moon, of the Sun, of other planets which put in (quasi-periodical) motion the fluid masses from the Earth (water of seas, atmosphere).

11 Not in the C.P.D.S., because the Black Sea/Marea Neagra, Mar Negro, Pontus Euxinus/Xinus, Kara Denis, Ciornoe More, Schwarzes Meer, Fekete Tenger, is almost completely closed sea where the amplitude of the tidal oscillations of the levels of this huge mass of water are extremely small.

12 The hydraulic energy, which —*in processus Historiae*— has substituted in a great extend the physical human force, was not only a factor of progress in Technique, but the social use of this kind of *Energhia* has produced a very technical-revolution, with a lot of specific consequences (revolutionary, et al) in many connected activities of relevant societies[13,14].

13 The use of the hydraulic energy as "«power» of some important technical systems is known still the IInd century b.I.Ch. in Illirium (Illiria), Asia Minor (Little Asia); this «*technica*» was improved in the Roman World/*Imperium Romanum* (by the substitution, in some cases, of the use of the horizontal wheels with that of wheels vertically directed). In the XI – XIVth centuries were conceived, constructed and used *in praxis* the hydraulic mill (*moara cu apa*).

14 Recognizing its importance many prominent historians has named it: the prototype/superior model of medieval Technics/industry.

15 From the beginning of the XIXth century.

16 From the second part of the XIXth century.

17 These methods, procedures, receipts, respectively artefacts are «adiacent» to the millings-mills *proper sensu*.

18 The discovery and the application on a large social scale of the new sources of energy (steam power, internal combustion engine, electricity and magnetism) suddenly created a gap between the dynamics of values of urban and rural civilization.

19 Which are the *locus* (*centrum, sedes, domicilium*) where these activities were initiated and developed with specific *curricula*.

20 Globally, locally: in different zones, some of them archaic.

21 Thus we can deduce/represent the status/*imago* of the evolution of «*Moara*» (Mill & Millings) in some sequences of its historical evolution in the C.P.D.S.

22 The *limes* in historical *Tempus*, cca. 1825, is very relevant: the end of Enlightenment (*Siècle des Lumières/Ilustrado/Aufklärung*) era in Western and Central Europe, the extension of Enlightenment (with: the existence of servdom in C.P.D.S., the end of the *Fanariot*-ic era in Moldova, Muntenia Principalities), the beginning of several revolutionary social changes (with specific caracteristics), in Western and Central Europe, (the

«French revolution», the post- «French revolution» mutations (the napoleonic era, the period between 1800-1825); in C.P.D.S.: motion for national-social emancipation (ruled by Tudor Vladimirescu), the many mutations and major changes of *Technica*.

23 This kind of «milling» is a *sui generis* one: the simplest, i.e. the materials «milled» are not fragmented (hulled, crushed, granulated, powdered, etc.) but its (thin) entities are physically transformed (change of compacticity, et al).

24 The cereals are a special category of vegetables with a prominent milling: *mori de fainuri* (flour mills); in which some seeds (grams) are prepared in powders (dusts) used for remaking farinaceous products.

25 The principal species of mill-milling: the flour-milling is known in C.P.D.S. from the prehistoric times (in a simple form: put in motion by the force of hand of some men); the Romanian names: *samînta* (*semen*; seed), *a semana* (*seminare*; to sow), *grîu* (*granuri*, wheat), *pâine* (*panem*; bread), *faina* (*farina*; flour), *moara* (*mola*, mill), *morar* (*molitor/molendarius*; miller), et al. are derived directly from (popular) Latin.

26 It was considered by many technicians, historians, philosophers, artists, observers, as the «*monumentum princeps*» of the *Historiae* of this *Evum of Tempus* [1] [2] [29] [45].

27 Very few known in positive details by the researchers. The civilizational-cultural relation between the inhabitants of the C.P.D.S. and those of the Balcanic Peninsula were real and significant: (the myth of Orpheus, Bachus/Dyonissos, the Dorian migrations, the Greek *polis* in the Pontus Euxinos (Black Sea) area et al [27] [28] [30] [31] [38] [43].

28 The C.P.D.S. was the geographical space where was originated (probably) the myth of Dionisios (Bachus), in pre-Roman Dacia. During the reign of the king Burebista and the priestship of Deceneu, the religious leader of the cult of Zalmoxis, was decided by the highest authority of this antique state the first law of prohibition recorded by the historians, i.e. in some areas the vineyards were destroyed and the soldiers and peasants were obliged to diminish the consummation of wine.

29 Described in detail by the Roman architect Vitruvius; this type of mill is appealed by many historians the Vitruvian-type [1] [34] [45].

30 Economy, relations, rights, forms of property, ergonomical forms, et al.

31 In the frame of feudal not «completely frozen» society.

32 After the new system of harness became wide spread: instead the neck-strap, used in Antiquity, it was introduced the breast-strap (*hamuri*) procedure which is more efficient.

33 Was discovered in the years 1980; is described in the monography worked by Maria Bâtca, Vlad Bâtca, Zona etnografica Teleorman, Editura Sport-Turism, Bucuresti, 1985.

34 Observers of this kind of archaic mills have found some similarities between the «*facaie*» (spoons) of peasant mills which existed and continue to exist in some areas of C.P.D.S. and the «technical-principle» of construction and of function of some modern efficient «*machinae mirabilae*»: the turbines with action of Zuppinger, Bonki, Sfindex, of the American engineer Lester Pelton (1829-1908); this reputed turbine consist, *in aesentia*, in rezistent metal (iron, bronse, steel) wheels with cups (buckets: organically «carved» in the structure of wheel) over him act physically the water carried from the hydraulic source by an appropriate pipe (tube: duct) in such a manner that it is generated a strong water jet, the strong hydraulic jet shock the cups and put in rotation motion the wheel

of the *turbina*, motion which is adequatelly transformed and used *pro Technica* in different purposes [2] [29].

35 In the world reputed *Deutsches Museum von Meisterwerken der Naturwissentschaft und Technik in München* is expressed a «*moara cu facaie*», transported here from the Romanian territory: the exhibit is placed still from the foundation of this prestigious Museum, in the hall of «Machines of force» (*Kraft-Maschinen*), the written explanation give correct informations about the *Löffelrad of Rumänische Mühle*[36].

36 For the young endowed student at the Politechnical School in Charlottenburg, Dimitrie Leonida (1883-1965), the vivid contract with this exhibit has amplified with a strong resolute impetus his irresistible desire to found a Museum of Technics in Romania. This elevate desire was achieved some years later, in the inter-world war period, and in this museum, located in the *Parcul Regele Carol I* in Bucuresti, is placed, *ab initio*, in a honorable position the *moara cu facaie* from Ciuperceni (*judetul Gorj*).

37 In this area the rivers (excepting the Danube) are of minor importance (relatively short; with a small quantity of water), they are often winds (coming from the sea); the region was longtime included in the Turkish Empire.

38 In Dobrogea (Dubrudja) are attested *in documentum*: in 1585; at the beginning of the XXth century has existed 437 mills in work in the most important town Tulcea.

39 The mills with sails were used in some European (Mediterranean, Atlantic) areas: Greece, Portugal, et al. [45].

40 Dutch type.

41 Where are located the reputed little towns with rich mines Auraria Maior (Abrud), Auraria Minor (Zlatna), Rosia Montana, Sacarîmb, Brad, et al., reputed in Antiquity, and also later, until nowadays.

42 A part of Transylvania (*Septem Castra, Siebenbürgen, Erdély*) inhabited in a massive majority by Romanians.

43 They used slaves: *damnati ad metala*, et al. [4] [27].

44 After the war between the Prussian Kingdom and the Austrian Empire, when Austria was defeated (the batle of Mollwitz, et al) and the Empire lost the rich industrial province Silezia/Schlesien.

45 Mentioned in a Latin manuscript (written in 1395/6) [49] [50] [51].

46 Which are names of: illirean-tracean origin, respectively latin (*Vultor – Vultoris*).

47 In a document dated 1342 written in Latin in Olosig in Crisana is recorded the existence of a fulling mill (*molendinae pilatoriae*); and the use of can-shaft driven by water wheel is qualified *nuovo ingeno*.

48 Patrimony unique in the World.

49 Exposed in some *museum vivum*: a creative combination of museum-recreational area-technical educational project-forum [8] [9].

50 An impressive sentence: «the mill of time works slowly but seriously!» (*'Moara timpului macina încet dar bine!*)

51 a. In many oral mentions (proverbs, stories, songs): «*roata morii se'nvârteste, tac-tac-tac*»/ «the wheel of mill is in rotation, tac-tac-tac», «*a da apa la moara*»/provide water to the mill, (i.e. to have good conditions for some honest/malefic interests/actions), the mill of chance («*moara cu noroc*; the play «*moara*»), «*multi tot urca si coboara, Unul*

*macina la Moara*»/in the Mill many persons are in ascensional morion (with their bags), many are in descendent motion (idem), One (person: the Miller) mill in the Mill»; etc., etc.], b. in archives: processes, conflictual situations; in some new villages at their beginnings it was built firstly the mill and after the solid church of stone walls; the uses of milled products: for the benefit of communities (schools, churches, roads et al.), c. the relation mill-market-communications (with various implications and information) etc., etc.; d. the mills and some extraordinary or paranormal phenomena (riots, plots, smuglings, meetings, etc., ghosts, «visits of devils», magical practices, etc.), et al..

52 Physical, chemical, biotical; «somatic» basis for the psychical and social livings (perceptions, willings, feelings, thoughts, propensions, dreams, visions, ...).

53 The universal history of Mills & Millings is a great theme of History (of Science, Techniques-Technology, et al.) and was studied during «the flow of centuries» by many researchers and other intellectuals (engineers, artists, literature-makers, observers, commentators)[54] and will be, surely, studied also in the future [1] [2] [3] [4] - [74].

54 Some aspects of the «*Moara*» are studied in Romania by many scientists: the etnograph dr.Corneliu Bucur (author of a doctoral thesis achieved still in the years 1960's, and of other documented studies; several of them published in the revue Cibinium, et al.), researcher Ana Grama (studies on cultural implications of mills, rigurous archivistical researches et al.).

55 This co-living within civilization & culture was continued, *mutatis mutandis* in the XIXth and XXth centuries.

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## SCHEMATIZED REPRESENTATIONS OF SOME SIMPLE MILLS

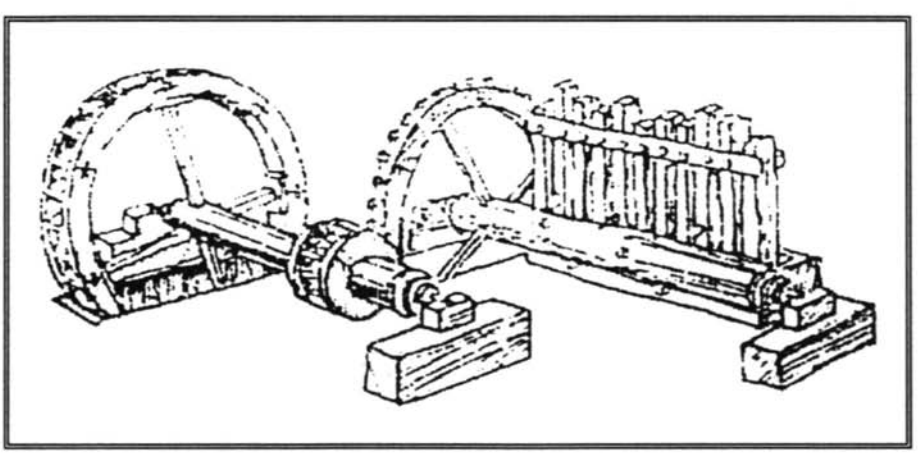

***Figure 1.-*** *The stamp-mill (steamp) realized by the magister naturalis Munteanu Urs [13]*

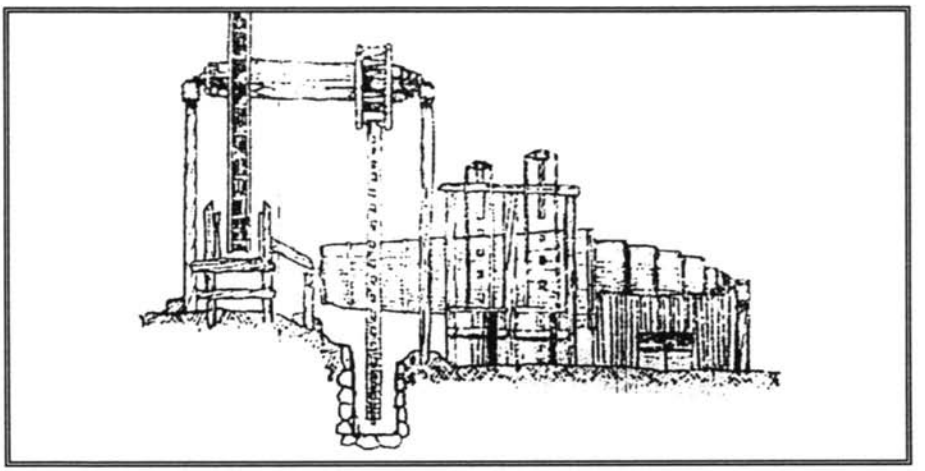

***Figure 2.-*** *The machine for washing ores built by the magister naturalis Munteanu Urs [13]*

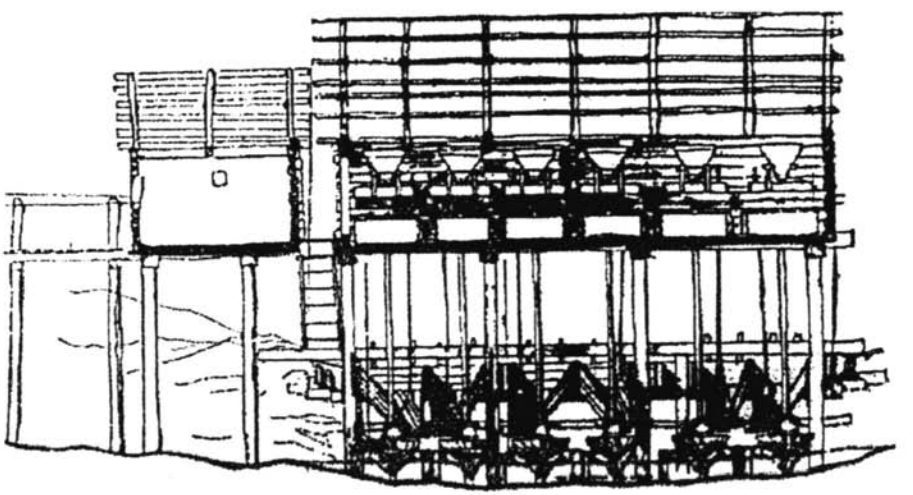

***Figure 3.-*** *Cross-section through the mill:*

*1.mill • 2. «conac» or miller's housE • 3.shaft • 4. horizontal water-wheel • 5. trough 6. «raiser» for the trough • 7.cross-beam supporting the waterwheels or «pasada» 8.ladder • 9. loading-funnel • 10. feeder • 11. wooden-framework profecting the stones 12. flour-bin[8]*

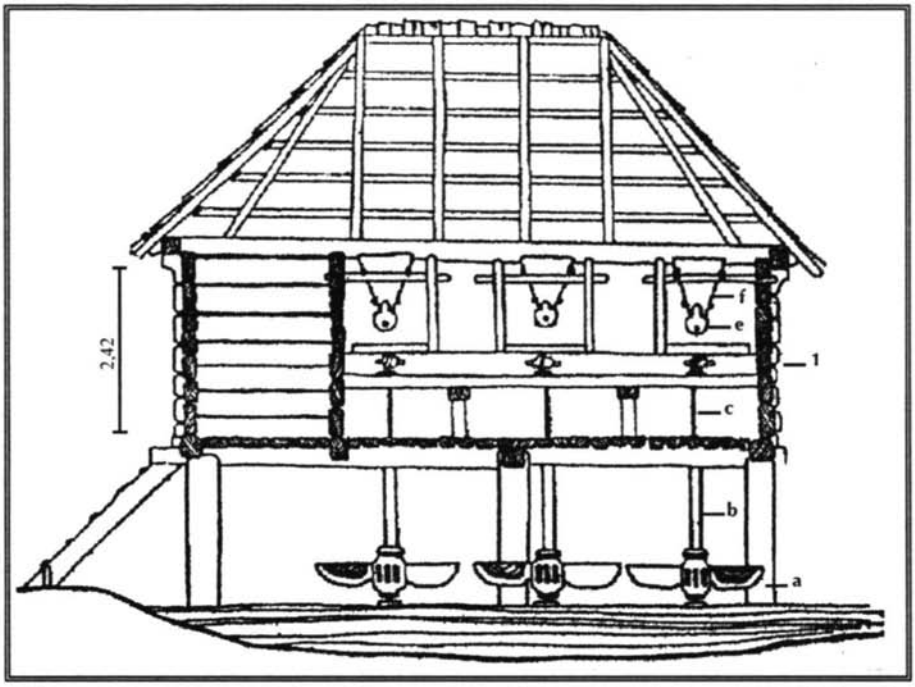


***Figure 4.-*** *Section through the mill: a. water-wheel, b. wooden shaft, c. iron shaft, d. socle of the mill-stones, e. feeder, f. loading funnel [8]*

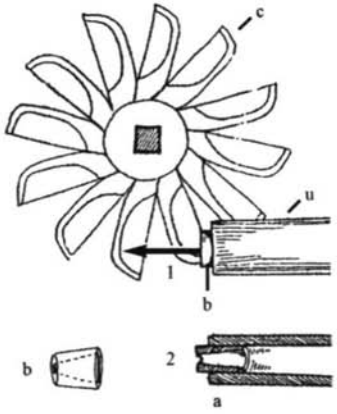


***Figure 5.-*** *The popular wooden turbine: a wheel equipped with «spoons» installed in a Mill.*
*1.Admission through «buttons»: a. «buttons», b.plug, c.horizontal water-wheel*
*2.Cross-section through: a. «button», b.plug [8]*

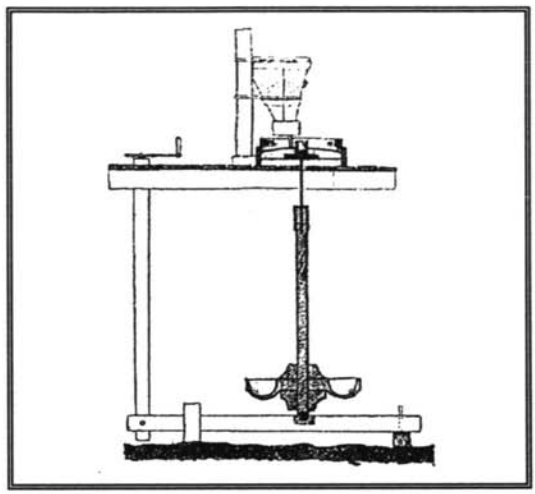

***Figure 6.-*** *Cross-section through the mill-mechanism with the system for raising the millstones:*
*a. raiser, b. crank, c. horizontal water-wheel, d. wooden-shaft, e. iron shaft, f. nether mill-stone, g. running mill-stone, h. feeder, i. loading funnel, j. mill-stone socle [8]*

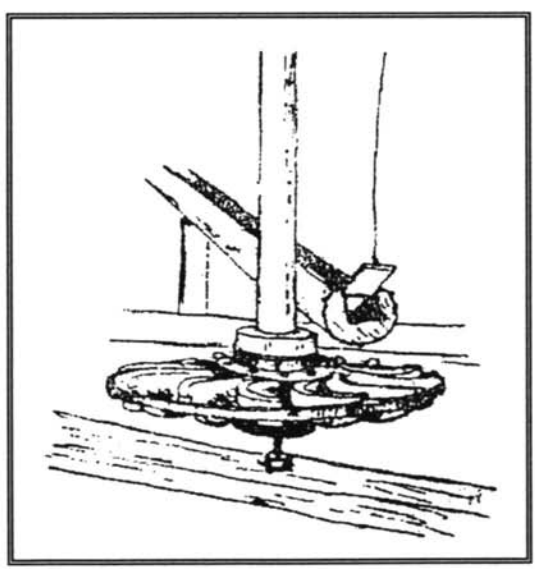

***Figure 7.-*** *The water admission system of the horizontal wheel [8]*

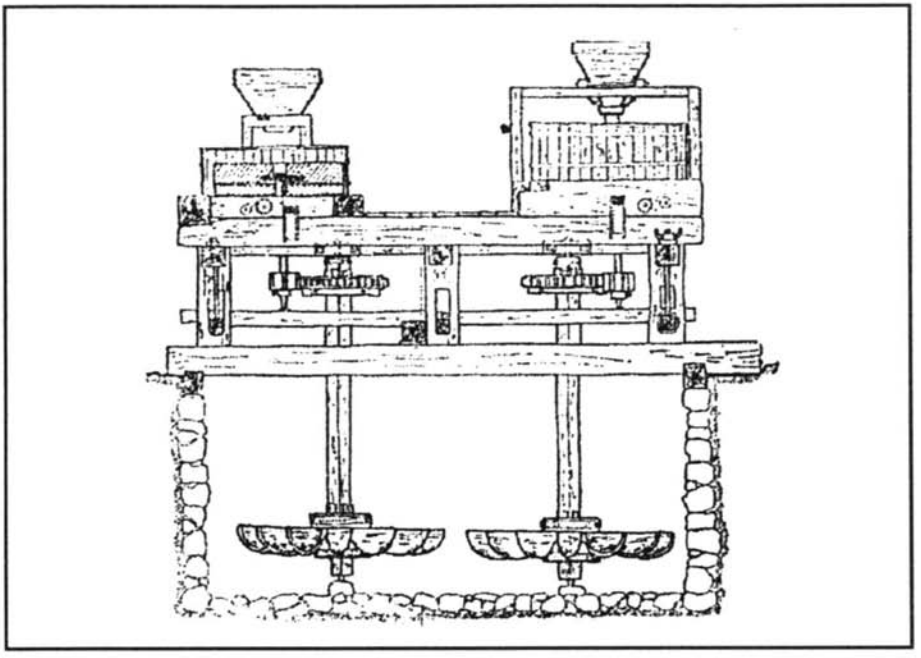

***Figure 8.-*** *Water mill with two dip buckets and belt drive – Râu de Mori, Hunedoara County [8]*