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Abstract This paper presents old milling machines, defining technical and cultural identity of mountain area communities that are part of Europe 's technological identity, machines that are still operating in Romania . These equipments have the advantage of manufacturing ecological products, having both touring and practical importance in sustainable development of mountain area.

Keywords : old milling industry, sustainable development

1. Introduction

Ethnology of the third millennium becomes a holistic interdisciplinary science, integrating various categories of sources belonging to the humanities, engineering and natural sciences. One of the relatively newest ethnosciences, which was formed out of an unlikely marriage some time ago between physical anthropology and mechanical engineering, is paleo-engineering. This paper presents a systematically approach of different mills types, located in a certain area, in the context of the rediscovery and rehabilitation of cultural identity of mountain communities. Technologies in these areas are often functional and also very helpful for local people. Most information on this chosen theme is superficial and laconic. The sources referring on this subject of Romanian ethnology consist of narratives and stories of foreign travelers who visited Romanian lands. Those data, being usually a result of direct observations and experiences and covering a long time period that includes the fourteenth to the nineteenth century, are extremely valuable in this matter.

2. Historical approach

More details can be found in documents published by researchers at the *Institute of History "Nicolae Iorga"* [2]. Foreign travelers mentioned the utilization of hand mill, which "comes" from ancient times and was used in almost all households, but they describe also complex installations: fixed or floating water mills, with horizontal or vertical wheel, windmills, which are identified only in Dobrogea and animal operated mills, which appear only in Transylvania .

German officer E.H. Schneider von Weismantel, noted in years 1710 – 1714, in northern Moldavia : "all have hand mills in their homes, they grind fresh flour every day as much as they need for a day".

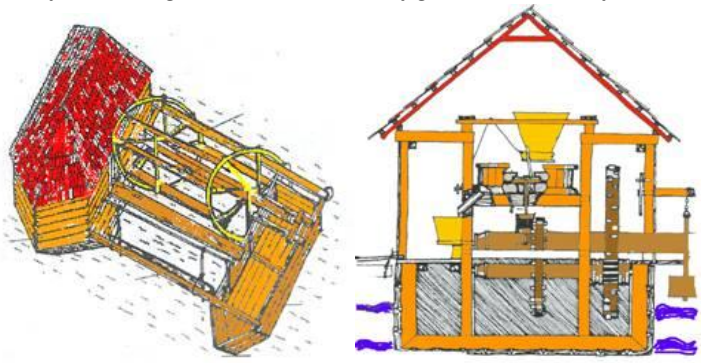
In 1657, Paul of Aleppo tells about Tismana Monastery die: "a little die, clean, always turning and grinding grain for them all they need, without trouble and without difficulty". Paul of Aleppo also describes the die from Orhei – Moldavia , in 1654. It was a horizontal wheel mill: "of pond, water is gone by means of channels to turning mills".

Of those who described and presented, from technical point of wiev, ancient mills in Romanian Countries, still operating today, it can be mentioned: Andrea from Forli, Jean Claude Flanchât, Metropolitan Neofit of Crete, Karl Friedrich von Magdeburg, Ivan Ivanovici

Severin, Sir William Sidney Smith, Evlia Celebi, François de Pavie, Niccolo Barsi, Ruggiero Giuseppe Borcoch.

3. Localization and constructional particularities of ancient Romanian mills

A deputation of Poland noted in the October 28, 1753 , the describing of the die from Oancea, district Galati : "Some of us went to the Prut River , which flows near the village and watched the mills on that river. The mills are built on floating bridges as those from the rivers of Poland . The only difference here is that they have not so good millers and flour is only grounded, because they don't use a sieve." (*figure 1*)



a. **b.**

Fig. 1. *Floating - Mill: a - view, b - section*

This type of mill is characterized by the fact that it was built in the plains where the difference of level was uncontrolled, flow was pretty good and the wind was low.

They are small mills that are currently in use. About their origin is said that some would be from the period of the Romans occupation and other mills, portable, would have Tatar origins.

A complex study revealed many original technologies of Romanian native population that proved the existence of an ancient and authentic civilization of wheat in the Carpathian – Danube space [1].

Characteristic windmills areas (*figure 2*) are those where air currents are formed continuously.

Fig. 2. *Field of windmills*

Thus, this type of mills was built in Dobrogea County , even in the Danube Delta, and in wind targeted valleys. These mills were fixed (*figure 3*), less complex in terms of construction and had a complex maintenance.

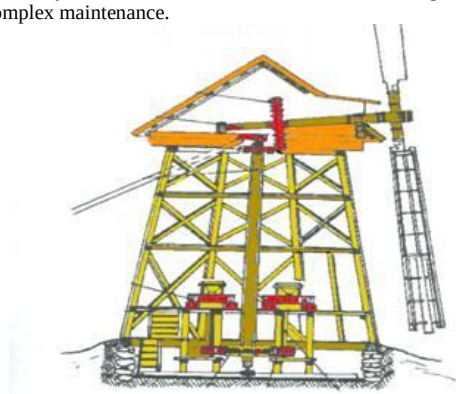


Fig. 3. *Windmill – section*

Mills with horizontal well (Pelton type) – (*figure 4*) are built in mountain areas where rivers flow was steady, but small. Area where the mill was built was reduced. In these areas the water headrace was advantage of the resulting level difference of relief feature. This solution had the great advantage that the drive wheel was coupled directly to the grinding mechanism, so practically there were no maintenance problems.

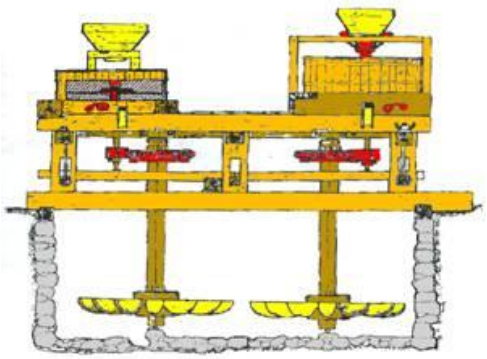


Fig. 4. *Die with horizontal well: a. - view, b - section*

Mills with vertical well (*figure 5*) were built in hilly areas where water flow was stable and had the advantage of greater power, allowing the adaptation of machinery annexes as: wood cutting boards, whirlpool washing machine, hammers for ore broking or presses for manufacturing vegetable oil.

It should be noted that each type of die, regardless of where the technology implementation was imported, Romanian peasant had to make some changes in the kinematical chain, for the maintenance and water headrace system operations. In many cases, has dropped two types of grinding, wheat or corn, and stone setting has changed to meet any type of cereal powder. Also, he has adapted the type of separation regardless of cereal flours ground. The only maintenance problem consists of manually sharpening the grinder. The grinder, having a weight of 300 – 800 kg , must be manipulated by means of a specialized fixing and elevation system (*figure 6*).

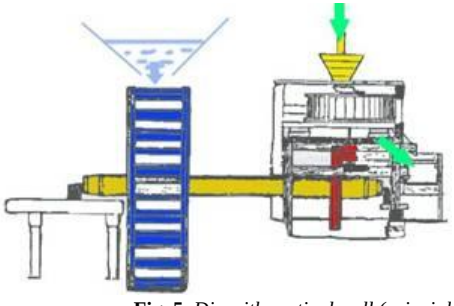


Fig. 5. *Die with vertical well (principle)*

Fig. 6. *Grinder elevation system*

In some cases, where water flow was unstable, the mill user made major improvements of even primary device, power generator, well. An interesting constructional solution was to achieve adjustable valve (*figure 7*), both for the direction and flow of water, used in horizontal well mills.

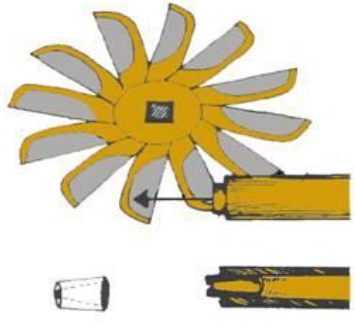


Fig. 7. *Die by injection*

4. Conclusions

Old dies are working even today. Owners have made many improvements, which often damaged autochthonous initial technology. For example, an electric motor was adapted to the main axis.

The interest for these mills remains very high, both for tourists and engineers. Moreover, the grinding technology, consisting of a slow and cold process, doesn't burn the flours and preserves vitamins and gluten.

These milling equipments represent an important potential for generating related activities positively affecting the population life and, therefore, the sustainable development of the area involved.

References

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