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CALIFORNIA'S FIRST WINDMILLS: THE RUSSIAN WINDMILLS OF FORT ROSS

by

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INTRODUCTION

This study of the windmills at Fort Ross was funded through the Cultural Resource Management Program administered by Senior Archeologist John W. Foster of the Cultural Heritage Section, Resource Management Division, California Department of Parks and Recreation.

Founded by Ivan Kuskov for the Russian American Company in 1812, Fort Ross was the main company settlement in California. Although its primary mission was to hunt for sea otters, over time it focused more on its secondary responsibility as a supplier of meat and grain to the Alaskan posts of the company. The Russian passion for bread is legendary and thus the need for quantities of flour. To meet this there were two windmills built at Fort Ross. Why they were windmills rather than water mills is probably due to a cultural selection by people coming from wind-swept steppes. The fact that the area of Fort Ross is also subjected to frequent winds probably made the choice easier still.

The mills of Fort Ross, particularly the windmills were frequently mentioned in various visitors' accounts. The best image of at least one of the mills was drawn by Il'ya Voznesenskii in 1841 (Fig. 1). These were the earliest windmills in California. The mills in Spanish/Mexican California were strictly water or animal driven. From inventories prepared in 1841, it is clear that there were two windmills, termed the "old" and the "new" mill, and in addition, a man or animal powered mill. A map drawn in 1817 (Fedorova 1973) shows what may have been the "old" mill (Fig. 2). It apparently stood somewhat north-northwest of the fort just below the present Highway 1. Its exact location has never been determined.

The "new" windmill described in the 1841 inventory has likewise never been precisely located, although Call family tradition does pinpoint a windmill having been on the hill between the Call House and the parking lot, in the trees (Barbara Black, personal communication 1983). The location she gave coincides with an 1857 survey of the Muniz Rancho (Higley 1857). However, a better known survey done in 1859 (Matthewson 1859) placed it some 150 feet away, up in the clearing at the southern end of the parking lot. This possible location was thoroughly tested by G. James West (1978) with negative results. The other potential spot (indicated by Barbara Black and by the late F. Kaye Tomlin) also has yet to be tested.

The descriptions of the windmill suggest a typical post-mill structure (Fig. 3). In Russian, post mills are called *stolbovka* (Medvedev 1994:9). Two types of *stolbovki* are described by Opolovnikov and Opolovnikova (1989:60).

The first consists of windmills built on tall supporting posts, which vary in their manner of construction and decoration. One visually impressive method of support features a high pyramid of logs (*koster*), as locals call it), laid directly on the ground or on bearing piers. Another type of support is a simple, massive log frame built directly on the ground. Though not very elegant, mills built according to this principle are very practical. The actual working space is much larger, allowing more room for all sorts of additional equipment, such as an extra pair of millstones and a peeling or hulling mill with pestles.

...A huge log serves as axle both for the wings and the transmission shaft; its bearings are the log walls themselves. Massive teeth, or cogs, are distributed along the transmission shaft. They raise and drop the heavy pestles for the hulling mill. The main (driving), toothed cog-wheel, nearly as big as the wheel of an old-fashioned locomotive, is attached to the same shaft. The cog-wheel transmits the rotation of the shaft onto a toothed drum and a vertical king-pin, and from the king-pin to the upper millstone.

Such mills required a substantial center post. This post would have been sunk into the ground at least two meters (Igor Medvedev, personal communication, November 1994). It would have been typically 50 cm (20 inches) in diameter based on a Russian drawing in Medvedev's file on windmills on file at Fort Ross (Fig. 4). The post would have supported the transverse pole on which the rotating mill wings would have turned to meet the prevailing wind. Typically, such post-mills utilized a long support pole attached to a wheel that would eventually wear a groove in the ground surface over which it rode. It would be conceivable that evidence of the post hole and the groove could still be found.



Fig. 1. Fort Ross Windmill in 1841 (Voznesenskii)

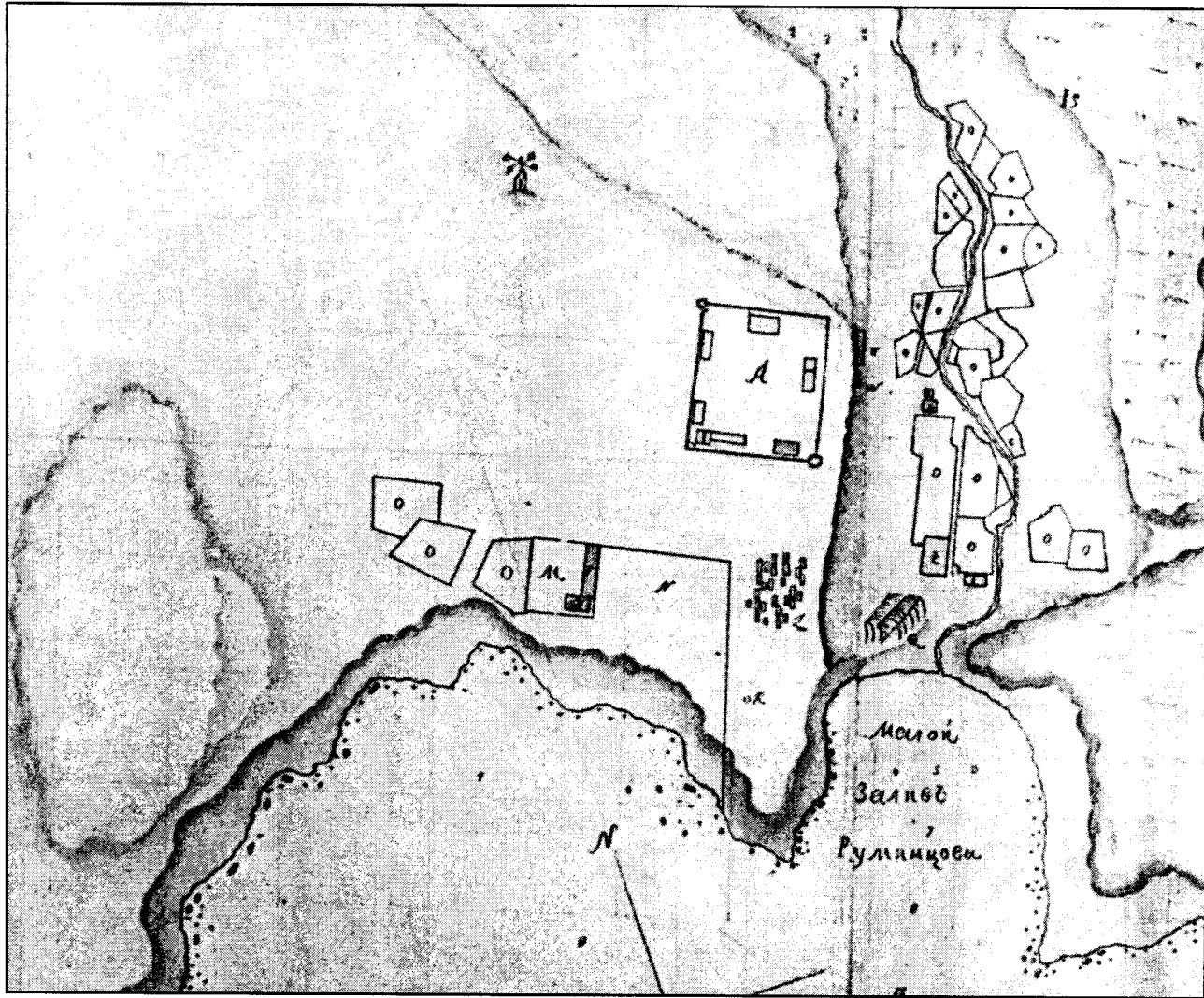
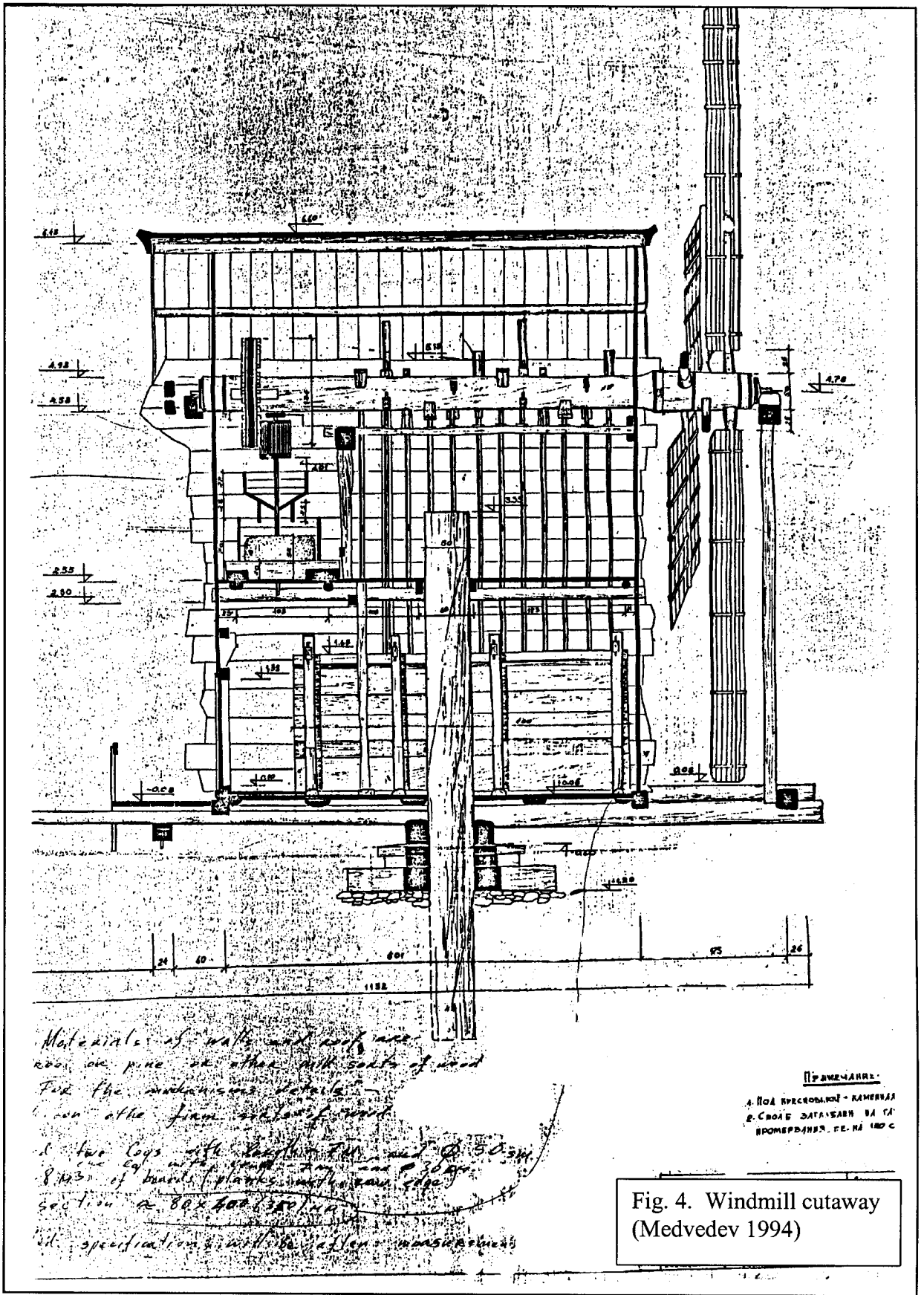


Figure 2. 1817 Map of Fort Ross showing relative location of windmill to the stockade (after Fedorova 1973:Fig.13).



Figure 3. Russian Windmill of similar design to the one at Fort Ross



Materials of walls and roof are
 oak, pine or other with coats of wood
 For the mechanism details
 see other firm's specifications

1. Two logs with diameter 100 and 150 mm
 one log upper end 2m and 30 mm
 8 mm of boards (planks) with bare edge
 section ca. 80 x 200 (300) mm
 all specifications will be after measurements

ПРАВЛЕНИЕ
 А. ГОД ВРЕМЕНАМИ - КАМЕРЫ
 Б. ЧИСТО ДАТАСАМ НА ГИ
 ПРОМЕРДИНЪ. ГЕ. НА ИНОС

Fig. 4. Windmill cutaway
 (Medvedev 1994)



Figure 5. Fort Ross in 1843 drawn by Gustav Waseurz af Sandels

HISTORICAL DESCRIPTIONS OF THE MILL(S)

1814 -- According to Khlebnikov (1976:108) a mill had been completed in 1814.

1816 -- An entry dated October 8, 1816 in a diary kept by Adelbert Von Chamisso, a member of the Kotzebue expedition of that year, mentioned that there was a windmill at Fort Ross, although he did not visit there himself (Mahr 1932:35-37).

1817 -- Drawing of Fort Ross executed in 1817 (Fedorova 1971; 1973). The scale of the drawing indicates the windmill is 63.4 *sazhens* (444 feet) from the northern blockhouse of the stockade (Fig. 2). Unfortunately, there is no further description of the windmill shown on the drawing.

1821 -- An account of Russian America in 1821 attributed to Kyrill Khlebnikov, and published by James R. Gibson (1976) mentions that in Fort Ross there was a "windmill for grinding flour."

1822 -- Fr. Mariano Payeras (1995:332-333) described the windmill he saw at Fort Ross during a visit on October 22, 1822 as follows:

To the north of the square at a distance of three [could be read as 2 on the original--GJF] rifle [musket?] shots they have a good windmill that grinds perfectly, all of it being made of wood from its foundation up...All the houses and the mill are generally of square logs placed one above the other. The roofs are of very long boards and with a lintel of lumber which joins them from above with gutters to avoid the entry of water.

1828 -- Auguste Bernard DuHaut-Cilly (1999:188) visited Fort Ross and drew a picture of the fort as seen from a point on the east side of Fort Ross Creek, above the cemetery and highway one. It is interesting that he does not mention windmills in his written account, nor are any shown in his drawing, although it appears that his drawing did not extend far enough on the right hand side to take in the windmill.

1833 -- In a report by Mariano Vallejo (1833) to his commander, he stated that there were

"two fine grist mills, one powered by wind and the other by water. These serve to grind all their wheat. Both mills are kept in constant motion by the ceaseless wind and by the water off the slope of the box canyon." [Note: this is the only account of Fort Ross that mentions a water mill.]

1833 -- Governor Von Wrangel visited Fort Ross in 1833 and left the following mention of a mill (Gibson 1969:207):

outside the fortress, facing and paralleling its sides, are located two Company cattle barns with pens..., a small building for storing milk and making butter, a shed for Indians, a threshing floor, and two rows of small Company and private houses with gardens and

orchards, occupied by employees of the Company. On a cleared spot beyond this outskirt stands a windmill.

1838 -- Faxon Dean Atherton (1964:106) described the mill at Fort Ross as follows:

August 31, 1838...Wheat produces here but 10 for 1. This year they have raised 4000 fanegas. They have a windmill for grinding flour, the only one on the coast.

1839 -- Cyrille de LaPlace (1854:44) viewing Fort Ross from his ship off the coast describes a windmill as follows:

un moulin aux murs blanchis, aux grandes ailes que la brise du matin faisait tourner avec vitesse; [a windmill with white walls, whose large wings were turned rapidly by the morning breeze.]

While departing Fort Ross, LaPlace (1854:164) commented on there being two windmills there:

Nous cheminâmes rapidement, et bientôt nous eûmes perdu de vue le fort, le petit clocher de la chapelle et les deux moulins à vent. [We rode away rapidly and soon we were losing view of the fort, the little bellfry of the chapel, and the two windmills.]

1841 -- A drawing was made of the fort by Il'ya Voznesenskii in this year which was later rendered into a watercolor (Alekseev 1987; Blomkvist 1972). Voznesenskii places the windmill in line with the northernmost structures of the Russian village (Fig. 1). Since his painting cuts off sharply at this point it is impossible to tell that there was a second windmill known to have been at Fort Ross based on the inventories. It is presumed that the windmill pictured by Voznesenskii is the "old windmill" mentioned below.

1841 -- Following are three descriptions of the mills at Fort Ross found in French and Spanish inventory documents:

Vallejo (n.d.) Inventory

Molino de viento (nuevo) de una piedra; ahi una machina para machucar cascara; puede molir 20 fanegas de diameter. [Windmill (new) of one stone; in this place a machine to pound [or grind] tree bark; can grind 20 fanegas [bushels] per day.]

Molino de viento (viejo) de una piedra. [Windmill (old) of one stone.]

Molino de sangre, de una piedra, ahi machina para machucar cascara, puede molir 4 fanegas. Machina para fabrican sarsial [Sp?] (cordages). [Mill turned by men or horses, of one stone, here a machine to grind tree bark, can grind 4 fanegas [6 bushels]. A machine to make cordage.]

Sutter Inventory (Sutter Papers n.d.) (Julian Mitchell version).

Un moulin à vent, à une pierre, avec une machine pour battre l'écorce; ce moulin peut moudre jusqu'à 20 fan. dans un jour. [A windmill, with one stone, with a machine to pound bark; this mill could grind about 20 fanegas (30 bushels) in a day.]

Un moulin à vent (vieux), à une pierre. [A windmill (old) with one stone.]

Un moulin à cheval à une pierre, avec une machine pour battre l'écorce. [A horse-powered mill with one stone, with a machine to pound bark.]

DuFlot de Mofras (1842) version of Sutter inventory.

Un moulin-à-vent neuf à une seule meule, pouvant moudre 20 fanegas (11 hectolitres) par jour, ayant en outre une machine pour écraser les écorces à tannère. [A new windmill with a single grindstone, able to grind 20 fanegas (11 hectoliters) [30 bushels] a day, having also a machine to grind the tanbark.]

Un moulin-à-vent vieux à une meule. [An old windmill with one grindstone.]

Un moulin à bras ou à bête de somme à une meule, pouvant moudre 4 fanegas (2 hectolitres) par jour; il y a en outre une machine pour écraser les écorces à tannère. [A man or animal powered mill with one grindstone, able to grind 4 fanegas (2 hectoliters) per day; there is also a machine to pound the tanbark.]

1842 -- John Sutter's agent in charge of dismantling Fort Ross, John Bidwell, mentions repairing certain gears in the windmill at Fort Ross.

1843 -- Gustav M. Waseurtz af Sandels (1945) visited Fort Ross and made a drawing of the area including the windmill. In his drawing only the old windmill in the open is shown (Fig. 5).

1844 -- Sutter wrote on April 24, 1844 to P.B. Reading (Woodward 1981):

For the Windmill in Ross we wanted to get made by Chamberlain or Neal -- 3 screws 23 inches long and 12 inch thick, one 12 inch auger 26 inches long. The Pataetas (?) have to be cleaned, etc. [hard to say if this still refers to the Fort Ross mill or to other housekeeping at Sutter's Fort--GJF].

1845 -- Ernest Rufus is quoted in the Munro-Fraser (1880:366) history of Sonoma County describing a windmill at Fort Ross as follows:

To the northward of and near this village [i.e., the Russian village or "sloboda"], situated on an eminence, was a wind-mill, which was the motor for driving a single run of burrs, and also for a stamping machine used for grinding tan-bark. This windmill produced all the flour used in that and the Bodega settlements, and probably quite an amount was also sent with the annual shipment to Sitka. The burrs were made of the sandstone indigenous to that section, and seem to have answered the purpose well indeed. These stones were about three

feet in diameter, and one foot in thickness. One of them is still lying on the site of Fort Ross. This was probably the first flour mill of any description north of San Francisco and in the State. The stamp for crushing tan-bark was made of solid iron, and was about four inches square. It was hung upon a crank, upon the main shaft of the wind wheel, and the motion was thus given to it. It was a simple and very effective device, but required the constant attention of an operator to turn the bark and stir it up. This mill and stamp did good service for several years after the Americans came into possession of it; but not a vestige is left of it now, save the stone. This should certainly be cared for, in connection with the burr at the site of Captain Smith's old mill in Bodega, by the Society of Pioneers.

1857 -- In an "obsolete survey" of the Muniz Rancho directions to the location of at least one windmill are given. It appears to be the second windmill on the hill (now within the Monterey cedar forest).

1859 -- A repeat of the above survey which also mentions the windmill, but triangulates it from two locations different than in 1857.

1891? -- Author Gertrude Atherton visited Fort Ross in the early 1890s and later wrote a romantic story in which she mentions a windmill on a knoll behind the village near Fort Ross. The story ended tragically when the heroine's hair was caught in the mill wheel and she was crushed to death (Atherton 1894:263-277).

1958 -- This story reflects a similar one from the local Kashaya Pomo in which a Kashaya woman goes to the mill, gets her hair caught in the mill works and her scalp ripped off (Oswalt 1964:267). This story was told to linguist Robert Oswalt in September 1958 in the Kashaya tongue by Herman James. Mr. James' grandmother was Lucaria who is believed to have been born about 1804.

My grandmother told me this too about what the undersea people did. What I am going to tell about now is how they ground their flour when they raised and gathered wheat.

Where the land lies stretched out, where all the land is at Métini, they raised wheat which blanketed the land. When it was ripe everywhere, then the people, by hand, cut it down, tied it up, and laid it there. Then, in a sea lion skin, they dragged it to their houses.

They had made a big place there, with the earth packed down hard by wetting -- there they threw down what they had tied up. Next they drove horses down there. The person who drove the horses around there in a circle was one man who took turns with various others. When it was that way [threshed], when it had become food alone, they put it in sacks. While loading it in sacks, they hauled it off in stages to where their storehouse was. They filled that place up with lots -- many sacks. In order to make it [the wheat grown around Fort Ross] into flour, they had something that spun around for them in the wind -- they called it a "flour grinder." When they got ready to grind with that, they poured [the wheat] down in there to be ground, while tossing the sacks up -- that they did all day long. Then they filled the sacks with flour, hauling it away as before, they piled it up in a building. There was a lot for them to eat in winter.

Once, while a woman was walking around there, she happened to get too close while the wind was turning [the grindstone]. At that time, women's hair was long. [The woman's hair] got caught and turned with it. The woman, too, was spun around, all of her hair was chewed off, and she was thrown off dead.

They picked her up, carried her home, and cremated her -- at the time they still cremated. That is the way it happened; the flour grinder snared the woman and she died.

1978 -- State Archaeologist Dr. G. James West (now with the U.S. Bureau of Reclamation) led a survey and testing project to examine a spot that was identified using survey data from the 1859 survey by Matthewson. This survey provided compass directions to "the" windmill from two points during a survey of the Muniz Rancho. However, it did not give distances. An attempt was made to identify the location indicated by the convergence of the two compass lines and this was duly entered onto a park topographic map of Fort Ross. West set up a grid approximately 60 x 80 feet at the location thus indicated and completed some archaeological testing, however with no results. In fact, this location seems to be some 150 feet northwest of where the second Russian windmill was described to be by various Call family descendants (principally Barbara Black and F. Kaye Tomlin). I suspect that the survey points were not established properly and this resulted in a false triangulation.

1990 -- Ranger Dan Murley (1990) did field work and located a possible location for the threshing floor and possibly the old windmill. However, I believe that it is not the correct location because it is too far away from the fort to fit the 1817 map and drawing by Voznesenski. On the other hand, it is possible it might have been another structure such as the animal powered mill mentioned in the 1841 inventory.

1994 -- Igor Medvedev visited Fort Ross and prepared an article about the windmills of Fort Ross (Medvedev 1994). This was based on his own experience with country windmills in Russia combined with the images and descriptions of the Fort Ross windmill seen on the 1817 map, the 1842 watercolor by Voznesenskii (Fig. 1) and the 1843 drawing by Waseurtz af Sandels (Fig. 5). His description and detail on similar appearing windmills in Russia is invaluable, however, it is unfortunate that he did not have available the numerous other descriptions by various visitors as found in this document which generally seem to support his model.

2001 -- A contract was entered into between State Parks and Igor Medvedev in June 2001 to provide scale drawings of a traditional windmill fitting the description of the old mill at Fort Ross. The contract also specifies that Medvedev will have a working model of the mill constructed and delivered to State Parks by December 2001.

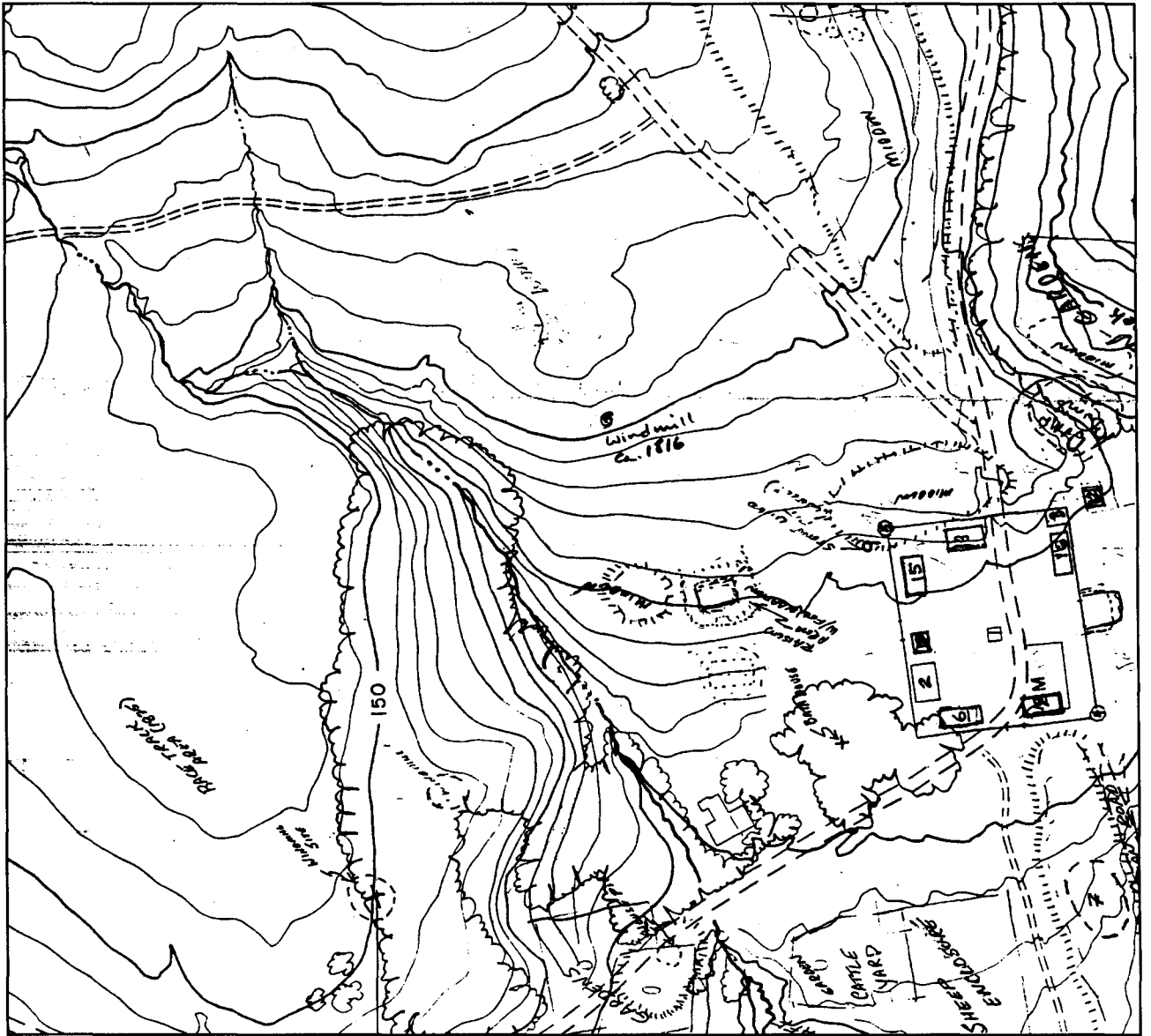


Figure 6. USGS Topo Map, 1958, showing 1817 windmill location

DISCUSSION

The presence of a windmill at Fort Ross is clearly stated in numerous visitors' accounts, however, only in the inventory documents and the comments by Cyrille LaPlace (in 1839) is there mention of two windmills. So it would appear that the second windmill may not have been constructed until late in the period of the Russian stay at Fort Ross. Vallejo mentioned a windmill and a water-powered mill during his visit in 1833, but this is the only mention of a water mill during the Russian period. The presence of an associated machine used to mash up tan bark is intriguing. Would it have operated off the same vertical post as the post mill? I suggest that the one most portrayed (1817 map, Voznesenskii watercolor, and the Waseurz af Sandels drawing) is the "old mill." However, that leaves us with no real concept of what the "new mill" might have looked like unless it was the one seen by LaPlace as he sailed off the coast of Fort Ross. I imagine this latter mill to be one like that pictured in a drawing of Sitka in 1827 by Mikhailov (Kalani et al. 1998:15). If so, it would appear to look somewhat more like a Dutch mill with a rounded exterior and possibly white-washed walls.

This study is a work in progress and perhaps archaeological findings will help specify where each part of the puzzle actually was placed.

PLAN FOR FUTURE RESEARCH

Future research should focus on two areas, archaeological and archival. Proof of the location of the three mills at Fort Ross needs to be established through archaeological excavation. Additional archival study may turn up as yet unknown sources that would help clarify the appearance and placement of the structures.

Archeological Testing

The most obvious evidence of a post mill should be the large, deep posthole that would have held the main support post. An initial attempt to use various ground penetrating equipment should be undertaken. Ground testing of any anomalies found would then be done using standard archaeological excavation procedures. I would suggest two test locations to attempt to determine the expected signature that could be applied to the windmill sites. The first would be to scan the area of a known post in the ground. One such is located in the southeast corner of the stockade area. During excavations in 1975 a four-foot long post was discovered in this location (Gallegos and Del Cioppo 1975). Next, the equipment could be directed to locating the flagpole near the center of the stockade area. If the sensing equipment is successful on these two features, it could be applied to the search for the mill post. If this fails, it would be desirable to use a grader to peel off layers of the surface to try to encounter the outline of the posthole. This technique is used extensively in the eastern U.S. in their search for posthole features.

Excavation of a posthole feature at Flowerdew Hundred in Virginia (Beahrs n.d.) revealed several iron hoops, clamps and staples that are believed to have been part of the main post of a post

windmill in early 17th century Virginia. Behrs (n.d.) raised the possibility that this mill may have followed a "mill design that has been documented in Scandinavia and Russia" that utilized a central post sunk into the earth. The possibility of such iron objects being found in the old posthole must be kept in mind during the geomagnetic testing and subsequent field excavation.

It is possible that other structures would be found in the vicinity of the mill, in particular the one described as having a bark-grinding mechanism associated with it. However, there should be a cleared area surrounding the mill structure to accommodate its turning radius.

Another possible element in the testing procedures would be to analyze the soil in the suspected areas for remains of cereal grain macrofossils and/or pollen (Vuorela 1986). In any milling operation there must have been some considerable spillage of grain that may leave evidence in the soil. Dr. Susan Bicknell of the Humboldt State University Forestry Department led a project to determine the pre-Russian vegetation in the area of Fort Ross. Her primary technique was to use phytolith analysis, or the study of small silicate remains from various species of grasses that grew around Fort Ross over the years (Bicknell et al. 1993). It might worthwhile to discuss with her the possibility of using phytolith analysis to identify areas where cereal grains were found in unusually heavy quantity.

Further Historical Research

It would be desirable to seek further into the records of the Russian America Company to attempt to find additional descriptions of the windmills at Fort Ross. In addition, the fine initial research undertaken by Medvedev on the probable physical structure of windmills at Fort Ross should be continued. Medvedev has expressed a willingness to construct a scale model of such a mill (John Middleton, personal communication 1999). This would be a valuable item to foster further interest in the eventual reconstruction of at least one of the mills. Such a construction would provide an excellent addition to Fort Ross SHP and would probably entice a considerable number of visitors into the park who would otherwise just pass on by.

ACKNOWLEDGMENTS

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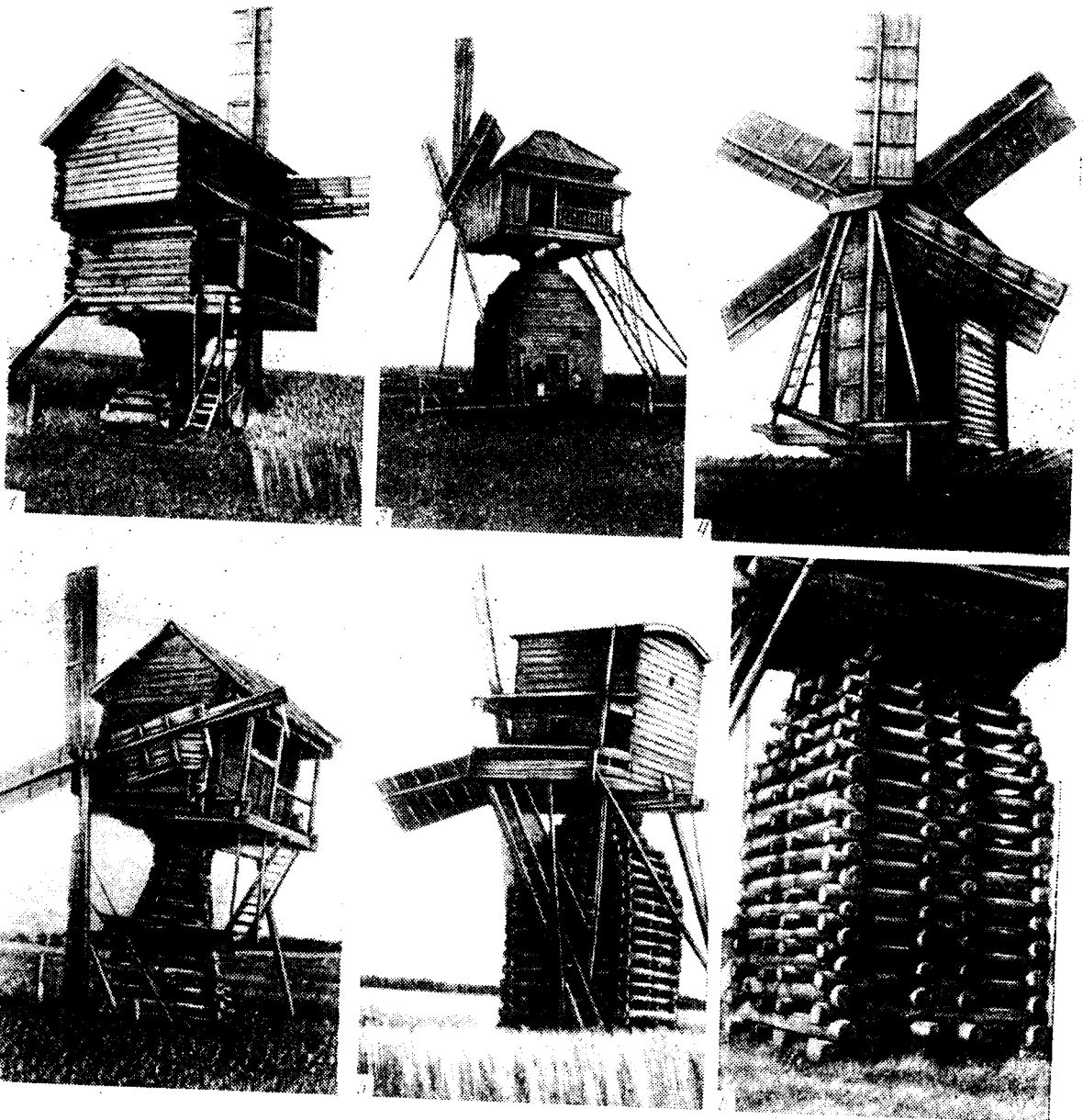


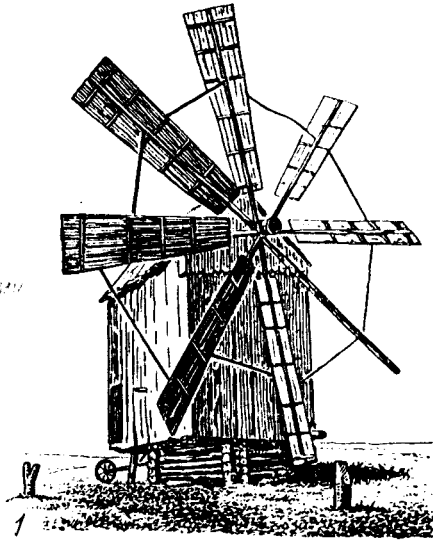
Таблица XLIV. Стержневые ветряные мельницы
1 — Вологодская губ.; 2, 4 — Олонецкая губ.; 3 — Костромская губ.; 5 — Архангельская губ.;
6 — основание той же мельницы

**ИСТОРИКО-
ЭТНОГРАФИЧЕСКИЙ
АТЛАС**

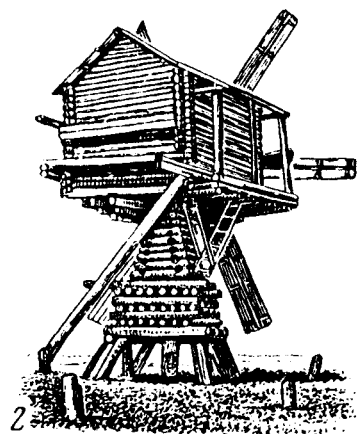
**ЗЕМЛЕДЕЛИЕ. КРЕСТЬЯНСКОЕ ЖИЛИЩЕ.
КРЕСТЬЯНСКАЯ ОДЕЖДА.
(Середина XIX — начало XX века)**

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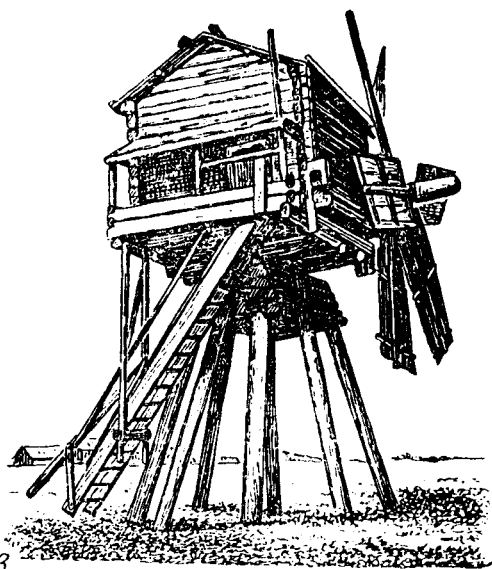
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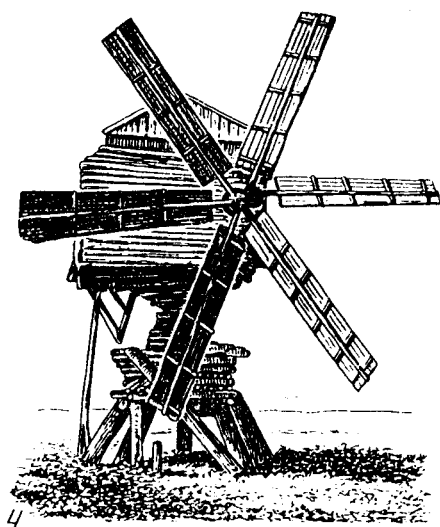
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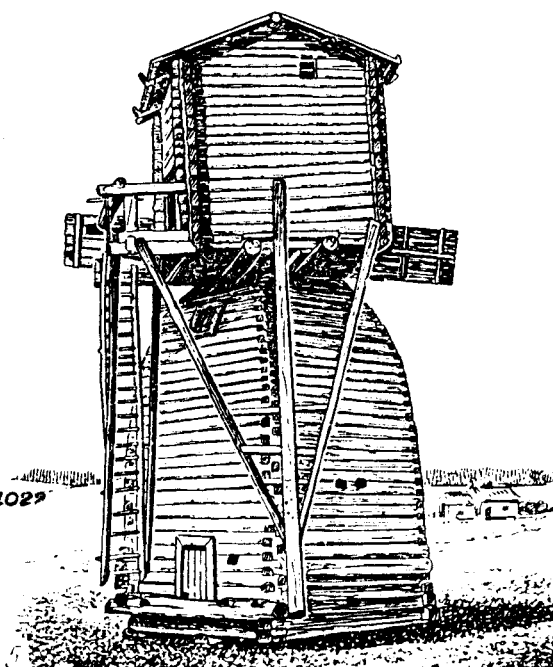


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5

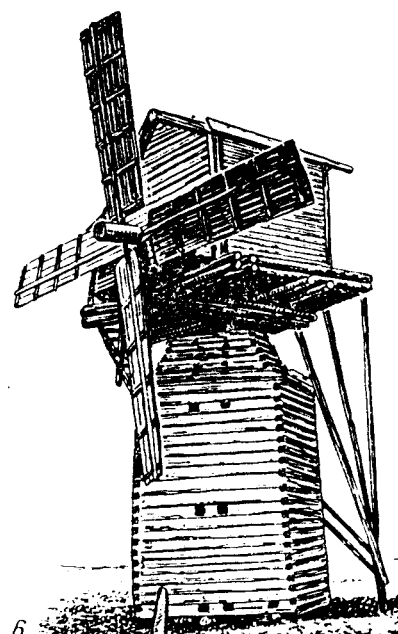
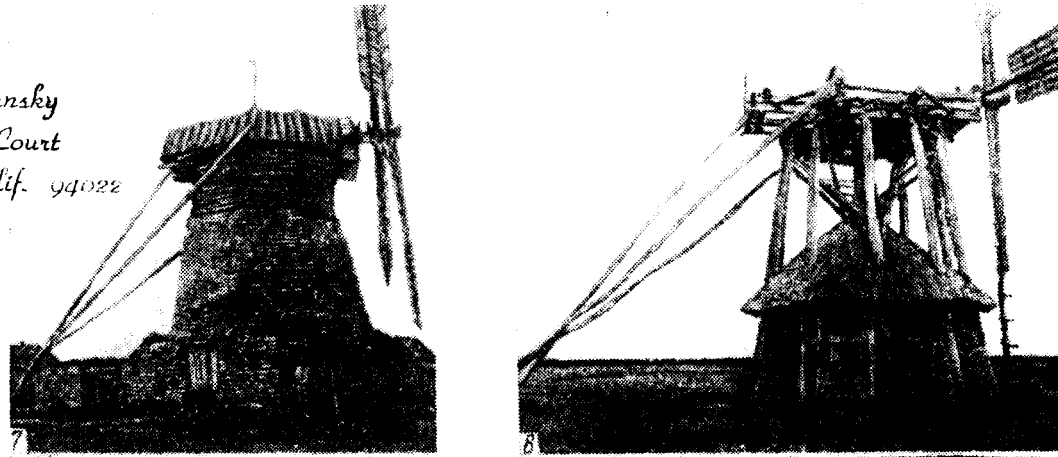
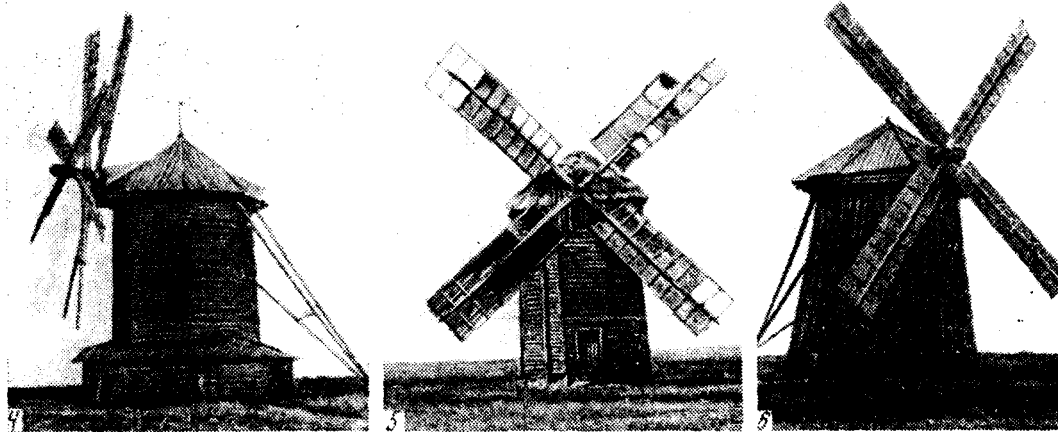
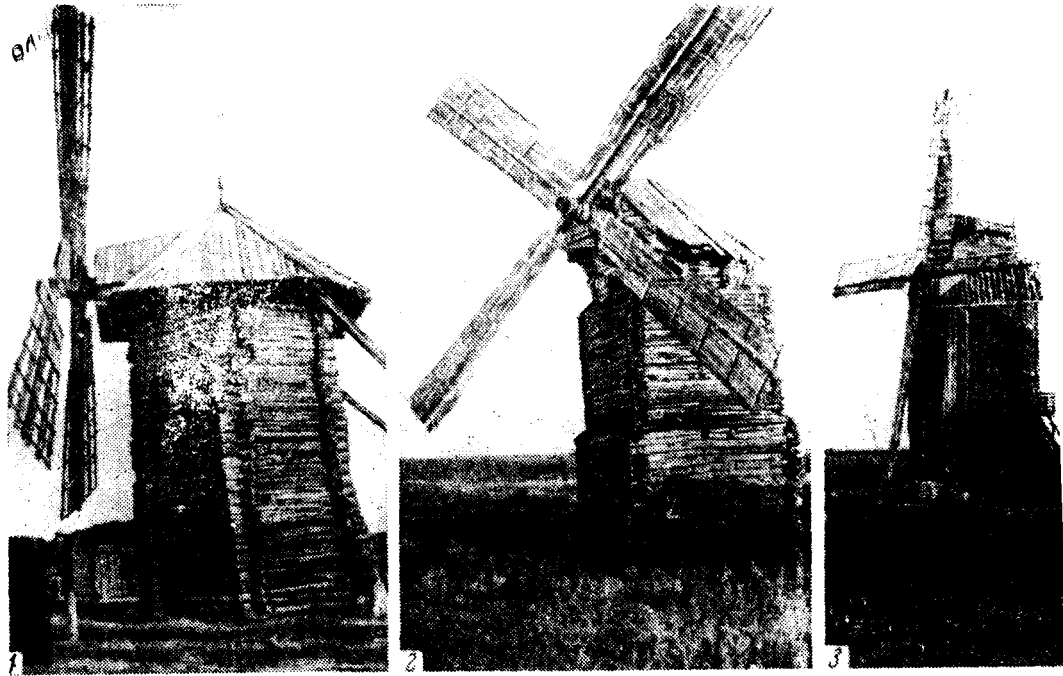


Таблица XLIII. Стержневые ветряные мельницы

1 — Курская губ.; 2, 4 — Вологодская губ.; 3, 5, 6 — Архангельская губ.

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ЭМЛЕДЖИЕ. КРЕСТЬЯНСКОЕ ЖИЛИЩЕ.
КРЕСТЬЯНСКАЯ ОДЕЖДА.
(Сережина XIX — начало XX века)

ИСТОРИКО-
ЭТНОГРАФИЧЕСКИЙ
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Таблица XLV. Шатровые ветряные мельницы

1, 2 — Оренбургская губ.; 3, 6 — Вятская губ.; 4 — Область Войска Донского; 5 — Курская губ.
7, 8 — Воронежская губ.

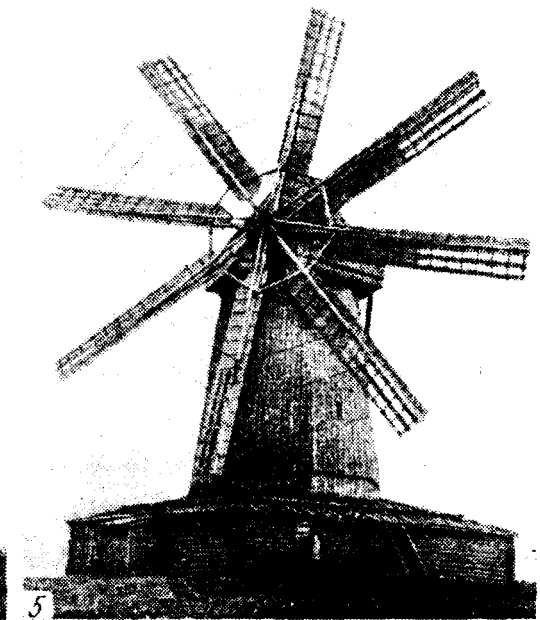
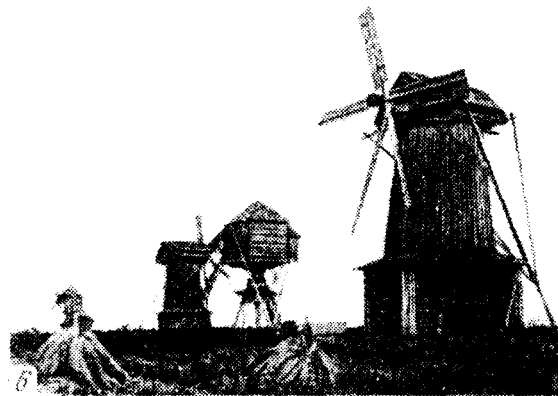
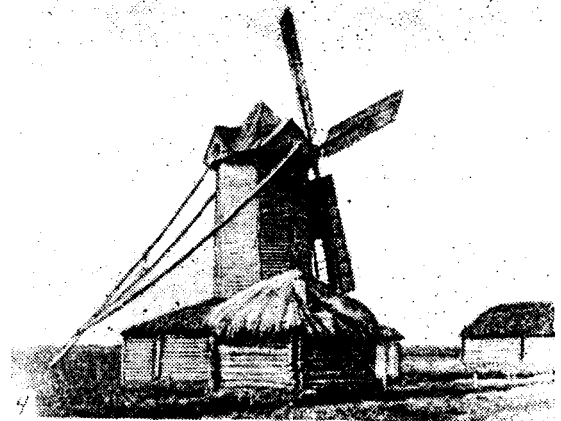
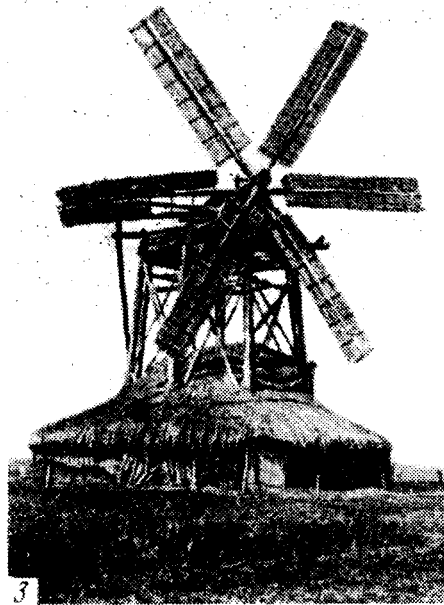
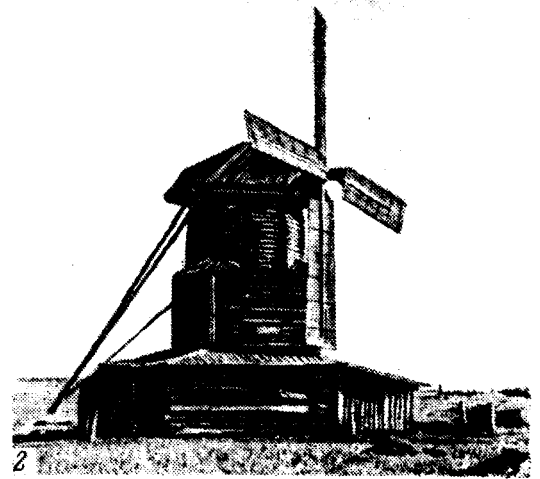
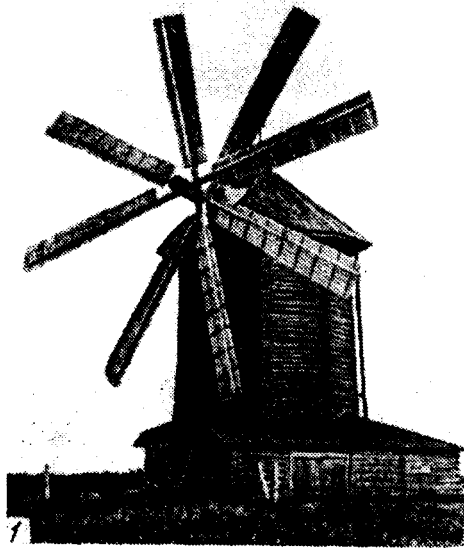


Таблица XLVI. Шатровые ветряные мельницы

1, 2 — Витецкая губ.; 3 — Тульская губ.; 4 — Оренбургская губ.; 5 — Орловская губ.
6 — Вологодская губ.

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