

A REPORT ON THE CIDER MILL ON THE SPERRY PROPERTY,
GUILFORD, CONNECTICUT

An Assessment of Its Significance and Condition and Recommendations for
Its Preservation and Use

Submitted by

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General Description and Significance

On Friday, October 8, 2004, we examined a cider mill in Guilford, Connecticut at the request of Robert Gordon. The mill is located on the Sperry property on Broad Street. The property evidently descended through several generations of the Stone family to the current owner, Robert Sperry, through his mother. The building was originally built as a cider mill and houses an early apple grinding mill (“nut mill”) and two cider presses. As such it is a rare surviving example of an early to mid 19th century special purpose farm outbuilding. Once a relatively common feature in the landscape of agriculturally based towns, cider mills operated by horse and manpower have become increasingly scarce over the past 50 years. They have been rendered obsolete by improved technology, the change in American tastes from hard to sweet cider, stricter health codes, and the general passing of the farm economy.

This mill is important for its rarity and is unusual for its continued existence just a short distance from the center of what is now a very suburban community. Its significance is heightened by the fact that the structure was expressly built for the purpose of cider making and to house the requisite equipment. The building incorporates certain structural features that create a wide open ground floor so that the operation of the horse-driven sweep of the nut mill and movement of materials in the mill are unimpeded by support posts. Because of the architectural interest of the building, the rarity of the surviving equipment, and the demise of old fashioned cider making in general, every reasonable effort should be made to preserve this mill and its contents.

THE BUILDING

The mill building, which measures about 24’ wide by 40’ long, is a one story structure with a gable roof and loft area at the west end. It is nominally oriented east-west on its long axis, and the west gable end of the building abuts River Street. The building is framed in a style commonly found in 19th century “English” barns in Connecticut and other areas of the northeast. The side wall plates rest on top of the posts and the transverse tie beams that span the width of the building meet the posts about 2-3’ below the tops of the posts. This framing scheme avoids the clustering of joints at one location at the top of the post or on the end of the tie beam, a framing

technique commonly found in some parts of New England. It is framed with six bents (transverse framing sections comprised of posts and horizontal tie beams) that define the five bays of its length. The frame is mostly chestnut and exhibits a mix of sash (up-and-down) sawn and hewn elements. The long side plates are hewn, and most of the remaining members are sash sawn.

The ground floor is wide open and unobstructed by medial support posts in all but the west end bent. Beginning at the east end of the mill, the first, third, fourth, and fifth tie beams that span the building from side wall to side wall are reinforced by king post trusses which place these 24' long beams in suspension. The trusses are made with a vertical center post that is tenoned at its base into the tie beam and braced on both sides by long diagonal braces that are tenoned into the horizontal beam a few feet from the ends. These trusses compensate for the absence of center posts in each of these framing bents. The braces in the truss over the nut mill bays are locked into the king post with opposing wedges while the braces in the other three trusses are simply tenoned into the posts without wedges. A long tie beam was never installed in the second bent from the east end. Evidence for this omission is seen in the unfinished mortise in the post on the south side of the building. It is possible that it was originally omitted in order to accommodate a large press or presses. [See Equipment below.] A long, makeshift pole is dropped into notches in the plate adjacent to the posts of the second bent to help tie this end of the building together. [See Condition.]

Currently, there is a two stage lean-to addition on the east end of the mill. The smaller lean-to, which is enclosed by a larger more recent addition shows in an early 20th century photo of the mill. However, because there is no center post in the east end wall and the transverse tie beam is reinforced by a king post truss, it is probable that this end of the building was originally open at the ground level. This would have provided easy access to the two presses located just inside the end wall. The current interior east end wall has two hatches, which presumably were used for shovelling out apple pomace after the juice had been extracted. Mr. Sperry recalls his grandfather keeping pigs outside that end of the mill.

There are shallower trusses in both sidewalls at the west end of the mill. The presence of the truss in the south wall strongly suggests a large doorway opening into the two bays that house the nut mill. The posts that support the large, asymmetrical double doors and the doors themselves that presently hang there are not original to the building. This opening would

have allowed carts and wagons loaded with apples to be backed into the building and offloaded into the nut mill.

The roof of the mill is lightly framed with squared common rafters 3' or more on centers. The rafters are half-lapped and pinned at the peak and do not support a ridgepole. What little hardware is evident in the building seems to be hand forged; only cut or later wire nails were observed in the fabric of the building and the equipment. There is a loft over the last two bays at the west end. A large gate swings on iron pintles embedded in the southwest corner post. Although a succession of gates has probably hung from these pintles, the pintles themselves and the gateway at that location are probably very old, if not original to the building.

EQUIPMENT

The surviving equipment in the building includes a nearly all wooden, horse-driven nut mill, two large wooden presses with two iron screws each, and a few incidental items such as cider kegs, apple barrels, (both hand- and machine made examples) apple crates, a wooden hoe or pusher for moving apple pomace, and a miscellany of other items. A thorough search of the equipment in the mill would probably reveal other articles that were part of the cider making process. The nut mill is located in the second from last bay at the west end of the building, and the two presses are in the first two bays at the east end. There is ample space around the nut mill for a horse to walk on the end of the sweep to drive the mill.

A. The Nut Mill

The first step in making cider is to crush or grind apples into pomace. The machine that accomplishes this is called a nut mill, so called because of the opposing "nuts" or teeth that perform the grinding.

This nut mill is comprised of a vertical wooden shaft with a conical base that revolves within a conical cavity inside a solid rectangular wooden "box." The perimeter of the base of the shaft, or runner, and the interior wall of the cavity in the box are cut with large spiral flutes. The flutes are open at the top but do not continue all the way to the bottom. The top of the shaft is fitted with a small iron spindle that rotates in an iron bearing plate mounted onto the bottom of a timber spanning the opening between two transverse tie beams. In order to avoid weakening the tie beams by cutting into the mortise and tenon joints of the king posts, this timber crosses at a slight angle. One end rests in a notch at the left side of one of the king posts,

and the other end rests in a notch at the right of the other king post. The bottom end of the shaft is borne by a cross beam suspended below the bottom surface of the solid box by threaded iron bolts passing through the box timbers. The cross beam can be raised or lowered by adjusting the hand forged, square iron nuts that secure these long bolts to regulate the tolerance between the runner and box as necessary. The box of the mill in which the fluted conical runner turns is comprised of four large, rectangular, sawn wooden blocks sandwiched together. The two external members are sash-sawn chestnut, while the smaller internal pieces are circular-sawn oak. No doubt the internal blocks are replacements of the original pieces. The blocks are laid on edge and bound together with forged iron bolts with nuts on either end. A hopper made of sash-sawn boards is mounted on the top of the mill to receive apples and funnel them down into the grinding mechanism. There are tally marks still visible on the hopper. Below the mill a large rectangular wooden trough made of sash-sawn planks joined by dadoes. This trough rests on the earthen floor of the mill and received the crushed apples, or pomace.

A large wooden sweep arm fits onto a tenon on the top end of the vertical shaft and extends outboard of the nut mill. This sweep, made from the natural crook or large branch of a chestnut tree, bends downward in two stages to the small end where there is a hand forged iron hook to which a horse was attached to drive the mill. A hole in the top end of the sweep that extends beyond the post received a pole that was used to tether the horse's head, forcing it to walk in a circle. This pole and its halter lead strap remain in the mill but were not attached to the sweep at the time of our visit. There is also a notch cut into the sweep arm with nail scars. The angle and location, along with an exceptionally smooth section of the vertical shaft, suggest that it may have supported a wooden piece that reached into the hopper and helped direct apples and pomace into the grinding mechanism.

There is more than adequate clearance around the mill for a horse to walk in a circle on the end of the sweep. The southern-most press is installed askew to provide a clear path. The large doorway on the south facing wall adjacent to the nut mill would have provided carts and wagons loaded with apples easy access to the mill. As noted elsewhere, this opening in the two bays was probably not originally closed with doors as it is now.

The extended mortise in the sweep where it fits over the tenon on the shaft can have several explanations. It may have been a mistake, i.e., the sweep may have been too long with the original positioning of the mortise; the sweep may have been reused from another mill; the original mortise may have failed structurally. Our initial premise that it was a replacement for

another sweep found in the loft proved wrong as the latter sweep was never finished or fitted with a mortise and is too large and of the wrong configuration to have been used with this nut mill.

The nut mill with a direct drive vertical shaft is a traditional form of apple grinding mill commonly found in New England at least as early as the late 18th century. One frequently described form consisted of two vertical wooden cylinders with meshing wooden or iron nuts (teeth), or nuts on one cylinder meshing into mortises on the other. One cylinder was turned directly by a horse-powered sweep arm. The nut mill in the cider mill at Old Sturbridge Village, which comes from southern New Hampshire and is thought to date from the 1830s, is considered an improvement over this arrangement. In that mill the pair of large cylinders, or nuts, that crush the apples are oriented horizontally and are driven by a large horizontal wooden gear mounted on a vertical shaft turned by a horse on the end of a wooden sweep. The perceived advantage is that the apples are evenly distributed between the nuts and the large drive gear increases the speed of the mill.

The nut mill in the Guilford mill is markedly similar to a patent cider mill described in an 1837 broadside by Nathan Booth of nearby Chester, Connecticut. (See accompanying photocopy.) The Booth design calls for iron teeth, regulates the tolerance of the male and female grinding pieces by wedges rather than threaded fasteners, and calls for the "box" in which the grinding occurs to be two instead of four pieces. But except for these minor departures, the nut mill in the Guilford mill is for all intents and purposes identical to the Booth design. Whether Booth or a consignee of his built this machine, or the minor design departures were intentionally made to avoid paying a patent licensing fee, are unknown. Any existing family records may well reveal this, but the similarity is important.

B. The Presses

At the other end of the building are situated a pair of large wood (chestnut) frame presses each with two large cast iron screws.

After apples were ground into pomace (and sometimes allowed to sit in the trough overnight to further soften) the pressing could begin. The pomace was wrapped in thin layers of rye or oat straw (common byproducts of early mixed agriculture) to contain it. These multi-layered piles of crushed apples wrapped in straw were called a cheese. After planks and a follower were placed on top, the screws of the press were turned down to extract the juice. Multiple pressings of the same cheese were common. The edges of the cheese were cut off with a hay knife (as is evidenced by

considerable scarring on the press beds) and piled on top for re-pressing to extract more juice. After repeated pressings, sometimes holes were chopped in the cheese and hot water poured in before yet another exertion of pressure. This yielded a diluted "water cider." We have not seen a mill with two presses before, but multiple presses would allow more efficient use of the mill, as juice could be running from one while a cheese was built or cleaned off the other.

Each press consists of two upright posts that support a heavy cross member that is mortised and through-tenoned to the posts. The two iron screws are threaded into iron nuts let into the bottom face of the cross member. Although the nuts do not seem to have the same profile from one press to the other, it is likely that the nut on one press is installed up-side-down. The bottom ends of the posts were originally cut with long tenons that fitted between the heavy transverse sills supporting the press bed. The bottom ends apparently rotted and were cut off so that the posts now rest on crude stone piers. The almost-square press beds of slightly different sizes are made up of several thick planks laid parallel and wedged tightly together. The top surfaces of the beds have an inch-deep perimetrical groove into which the juice from the pressed pomace would gather and run off at an outlet on the side facing the east end of the building. Both press beds also have a central groove as well, a feature which neither of us has seen before. The two follower planks are with the presses. They are cut with short tenons on both ends that fit into slots on the inside faces of the posts. The south side posts have notches at the top of the slots for the insertion of the follower planks. The planks are fitted with two cast iron cups that receive the round projections on the ends of the press screws.

The press screws have spherical heads above the projections with opposed holes through which a bar can be passed to gain leverage to tighten the screws against the follower planks while pressing out the juice. At least two wooden levers for this purpose remain in the mill. The profile of the threads on the press screws is of particular interest in that they are flat on the upper edge and tapered on the lower. This design was clearly intentionally adapted for use in a press that is intended to exert downward pressure, but allow for ease in raising. Perhaps this is a datable, or even patented, feature.

The presses are rather insubstantially braced at the top with light wooden bars that run to adjacent frame members of the building. The presses face the east end of the building, which as noted above was probably not originally closed in but wide open at the ground level so that barrels of

cider, loads of straw for making the cheeses on the presses, and other materials could easily be moved in and out of the building.

The presses may or may not be those originally installed in the building. As previously mentioned, the screw thread profile may prove to be a datable feature, although there is ample evidence of iron screws in early New England cider mills. Correspondents to Thomas Fessenden's "New England Farmer" magazine in 1825 (v. IV, #2) related their personal experience with iron screws and debated the advantages over wooden screws, for example. Guilford itself was home to an iron foundry by the 1840s. Nonetheless, these may have replaced earlier wooden screw presses, as the curious omission of the tie beam in the second bent is not explained by the presence of the current presses, which would not interfere with a beam in this location. This detail might be construed as circumstantial evidence for an earlier press or presses, but we could find no direct evidence to confirm this possibility.

C. Unrelated Equipment

There are several pieces of agricultural equipment stored in the building that seem worthy of local preservation. Among these are the fanning mill, cultivator, two cast iron plows, several scythes and parts of scythes and other hand tools. Although time did not allow for careful examination of these items, the two plows do stand out as being of potential significance. One is a late 19th or early 20th century "Oliver Chilled Iron Plow" in remarkably good condition; the stenciled name is still fresh on the side of the beam. Not necessarily a rare plow, it is nonetheless important because of its condition. The other plow is marked "J. DUTCHER" on the back of the moldboard. This plow probably dates from the 2nd quarter of the 19th century and is a rare survival. Dutcher plows figure prominently in discussions of the early development of the cast iron plow. It too is quite well-preserved especially in light of its age. This is potentially an important example in the early evolution of iron plows in the United States; there may be a comparable example at the Farmers' Museum in Cooperstown. If possible, all of the tools in the building should be reviewed for their significance to local agriculture and trades.

DATING THE MILL

The construction features, tool marks, and hardware all suggest an early to mid 19th century date for the mill. The use of straight posts instead

of flared, or gunstocked, posts, and cut instead of wrought nails throughout the building speaks against an 18th century date. The relatively light proportions of the frame also suggest a later date. The combination of sash sawn and hewn members in the frame are often regarded as indicators of an early 19th century date, but without a detailed knowledge of sawmilling activity in the town during the 19th century, it should only be considered within the context of other clues for attributing a date range for the building. The all-wooden, horse-driven nut mill with a vertical runner is an early form of apple grinding mill that comfortably fits into an early 19th century context, especially given the similarity to the Booth design. It might have become antiquated by mid-century, however. It is certainly possible that the presses are not original to the mill, although nothing more than circumstantial evidence was found to suggest this. Further, the profile of the threads in these presses may be a datable improvement in cider milling equipment. [See discussion in Equipment.]

It is tempting to conclude that the chalk inscription “W. L. STONE 1818” on one of the rafters marks the date of the erection of the mill. However, it was pointed out that William L. Stone was the great grandfather of the current owner, Robert Sperry, and that he was not born until 1858. The significance of this inscription and date is presently uncertain, although it may record a family tradition.

A thorough search of local manuscript records for any references to a cider mill on this property is certainly warranted. Presumably, Guilford families brought their apples to this mill to be made into cider. Also the Stone family papers should be reviewed for any records of repairs to the mill or replacement of equipment. Any such references in combination with the physical evidence would help to narrow down the range of date for the mill.

CONDITION

The condition of the building and equipment is of primary concern and may represent the most serious challenge to preserving the mill. Issues of structural instability and insect infestation need to be addressed promptly to prevent further deterioration of original fabric. Although every effort should be made to preserve original fabric in situ, some original materials will necessarily have to be replaced in order to properly stabilize the structure and the mill equipment. Ideally, all of these parts and the restoration/renovation process should be carefully documented in a project diary that photographically and verbally records the process. Also original fabric that is replaced should be identified and stored in the mill or in a safe

location. (The decay and insect infestation of these pieces should be stabilized first so as not to contaminate other materials.) An assessment of the condition of the various components and recommended conservation/restoration procedures by a professional building or objects conservator is certainly desirable.

The building is in surprisingly sound condition despite its age and specialized use. To some extent this can probably be attributed to the nearly exclusive use of chestnut timber in the building as well as in the mill equipment. Even when exposed to moisture, chestnut is a very rot resistant species. There are however, areas of the building that are beginning to fail structurally. The roof line of the building is generally straight except for a dip at the west end. This dip probably reflects the fracture of the next to the last transverse tie beam at its midpoint above the nut mill. The stress on this beam may be created by subsidence of the sidewall frames resulting from the failing support of the sills or the foundation; or it may be a consequence of water damage from a prolonged roof leak in this area. (Evidence of such a leak can be seen in the loft.) It is also necessary to clear all of the stored materials and debris from the building so that the sill level framing can be adequately examined. It is likely that some of the sills and bottoms ends of the posts will have to be replaced because of decay or insect infestation, or a combination of the two. Wooden sills should not be in contact with the ground where they will absorb moisture and set up ideal conditions for decay and insect damage. The soil should either be cleared away from the foundation or the wooden sills raised to ameliorate this potentially destructive situation.

The light, makeshift cross member adjacent to the second bent from the east end is pulling away from the sidewalls, especially on the south side. It is a potential hazard to people in the building. The separation suggests that the sidewalls are beginning to spread in that location. This problem should be attended to as soon as possible, preferably before winter as a severe snow load could dramatically worsen this condition. A cable and turnbuckle have already been added in the west half of the building to keep the sidewalls from spreading. It is probably advisable to install another cable or rod with a turnbuckle in the east end near this cross member to pull the walls back to perpendicular alignment.

Other than the slight subsidence near the west end, the roof appears in reasonably good condition, thanks particularly to the recent addition of a layer of asphalt shingles. This, of course, provides good protection for the frame and fabric of the building and for its contents.

Both the nut mill and the two presses are resting on the ground so that it is not currently possible to assess the condition of the support structures of these machines. It is clear, however, that they are seriously infested with powder post beetles, a condition that should be addressed as promptly as possible. Given that cold weather is fast upon us, it is probably not practical to make any applications of boric acid treatment until next spring since the insects are approaching their dormant cycle. The insect problem that is rampant throughout the mill is a common one to cider mills where the wooden machinery was seasonally saturated with juice from the apples, setting up ideal conditions for powder post beetles to thrive. Raising these machines off the ground and implementing an aggressive treatment program to slow, and eventually eliminate, the continuing insect damage will go a long way toward stabilizing the situation in the mill.

The two wooden frame presses are in a very distressed condition. The frames are severely racked, are riddled with powder post beetles, and appear in danger of imminent collapse. The posts are no longer integrally mortised and tenoned to the sills that run under and support the beds, but now rest on makeshift stone piers. It will be necessary to square up and brace the superstructures of both presses so that the beds can be disassembled to inspect the condition of the support members. The sills and other support members may need to be replaced in order to properly stabilize these presses. Hopefully, most of the superstructure and bed materials can be salvaged. It is likely that new material will have to be spliced onto the bottoms of the posts in order to stabilize the frames. Most importantly, all wooden materials need to be raised off the ground.

The nut mill is in better condition but also needs to be raised off the ground and treated for insect infestation. The floor of the trough and the bottom edges of the sidewalls are in full contact with the ground. More than likely further problems of decay will be encountered if it is raised off the ground, but this is vital in order to assess condition and to retard further deterioration.

Even when stabilized, the nut mill and presses will not be in sound enough condition to be used to grind apples and press cider. It is possible that the large cross timbers of the presses are not sound enough to resist the upward pressure of the metal screws and would fail under future use. Similar results might occur from using the nut mill. A horse walking on the end of the sweep can exert a potentially destructive amount of force on the mill and the frame of the building to which the mill is attached. Without wholesale replacement of original fabric in these machines, it would not be

possible to consider using them to demonstrate cider making. The machines, especially the nut mill, are too rare to be compromised to such an extent. Finally, this machinery was designed to extract juice that would be fermented into hard cider before consumption. Consuming the juice of this mill in its fresh state, as 21st residents would no doubt wish to do, is not advisable from a health-safety perspective. For all these reasons, operation of this mill is not advised. For alternatives, please see recommendations below.

RECOMMENDATIONS FOR ACTION

A. Stabilization of the Building and Contents:

1. Inventory, photograph, and record current location of all items in the mill.
2. Clean out the debris and materials stored in the building so that a full inspection of the frame of the building and the substructures of the machines can be undertaken.
3. Address the structural problems of the building that are cited in the above section on Condition, as well as others that will no doubt appear with a more complete examination.
4. Clear away the soil from all wooden frame elements, raise them above the ground level to reduce problems of deterioration, or design means of isolating them from the ground.
5. Square up and stabilize the superstructures of the presses preparatory to removing the bed materials in order to examine the condition of the sills and other support materials.
6. Raise the nut mill so that the condition of the support materials and the trough can be assessed.
7. Either raise the wooden elements of the presses and nut mill off the ground or clear away the soil that is in contact with these wooden components and isolate them from further contact with the soil.
8. Use moisture resistant materials to support the machines where they are in contact with the ground. Perhaps plastic lumber or concrete wallboard such as Duroc™ could be employed for this.
9. Begin an aggressive program of boric acid treatment on the nut mill and presses and any affected areas of the building to try to bring the widespread insect infestation under control. This should be started with the onset of mild temperatures in the spring, and continued as necessary, monitoring conditions annually

10. If possible, call in a professional building or objects conservator to assess the condition of the building and contents and to recommend a course of treatment.

B. Program Use of the Mill:

1. The building and the machines are too fragile, and the nut mill too rare, to consider using them to demonstrate cider making. They can be stabilized and restored to suggest their original working condition and their function explained by signage and graphics, and probably by live interpretation.
2. The cider making process can be demonstrated seasonally with a modern, portable grinding mill and press. These can be purchased either as separate units or in machines that combine the two operations. (Such equipment is presently used by Museum Education teachers with students and young visitors at Old Sturbridge Village.) These units duplicate the basic operations of the larger mill but on an accessible scale. This approach would allow interactive "hands-on" learning, and if fruit and equipment are clean could produce a sweet cider that is safe to consume.
3. An exhibit on early cider making could also include: early photos of the mill; images of other mills and the cider making process; references to cider making from local manuscripts; perhaps even reminiscences of area residents who remember taking apples to such a mill; extracts from 19th and early 20th accounts of cider making; apple and cider barrels, apple crates, funnels, a wooden shovel, and other paraphernalia related to the process.
4. A small display of coopering that draws from tools in the historical society's collection could accompany the exhibit, along with the hand-made casks and kegs in the attic of the mill.
5. Gather information about early orchards in the area and have samples, or at least illustrations taken from pomology books, of several early varieties of apples.
6. The mill could become the location for an annual local apple festival to raise funds for and awareness of the local historical society. Perhaps present area orchards could partially sponsor this event.
7. Any interpretation of the mill should include mention of

the well and well-sweep. This once ubiquitous but now all but forgotten feature was essential to keeping the mill equipment clean.