



B. F. Clyde's Cider Mill
Established 1898
Old Mystic, Connecticut

National Mechanical Engineering Site
Dedication October 29, 1994



History of Cider in the U.S.

Apple cider dates back to the earliest days of English settlement in the thirteen colonies. Colonists brought seed from England to plant apple trees. Later, seedlings and whole trees were transported to the colonies by wealthier colonists who established large apple orchards. Although apples were a staple in the meager diet of early settlers, the motivation for raising apple trees was equally for the purpose of making cider. Cider was easy to make, stored well, and provided a mildly alcoholic drink for all to enjoy. Until approximately seventy years ago, cider was what is now referred to as "hard cider."

Cider was an extremely popular beverage from the initial settlement of the New World until the early twentieth century. Quantities as large as 10,000 barrels (315,000 gallons) per year for a two hundred family community were produced in the early eighteenth century [Martin]. Additionally, saloons and inns considered cider to be one of their most popular beverages. The passage of the Volstead Act of 1919, more commonly known as Prohibition, resulted in the decline of cider's popularity.

Apple cider and its production was a significant piece of American culture for several centuries and was the predecessor of today's massive beverage industries. While the processing of apple cider has changed over the centuries, B.F. Clyde's Cider Mill continues to produce cider as it was produced over a century ago. From the earliest crude stone-crushed apples to the modern automated hydraulic presses, engineers have devised more efficient means to press apples. The screw press in use at the Mill represents the peak of screw press design used before the hydraulic press became prevalent.

History of B.F. Clyde's Cider Mill

Although cider continued to be produced on individual farms for private use, the centrally located mill became more popular. Because the early mills

required equipment that was operated only once a year, farmers found it more convenient to travel considerable distances to bring their fruit to a large mill for processing into juice (sweet cider). Surplus apples could be sold or bartered to the mill owner who would produce cider to sell. Farmers returned home and used their own method of fermentation to produce cider.

In 1881, Mr. Benjamin F. Clyde decided to produce and sell cider in Mystic, now referred to as Old Mystic. For the first few years, he pressed his apples at local mills. Eventually, he bought a press and installed it in rented space in the corner of a local saw mill. He received power for his press from the saw mill's line shaft. In 1897, Mr. Clyde decided to expand his business by purchasing his own mill and press.

Later that year, he purchased a No. 2, four screw press from the

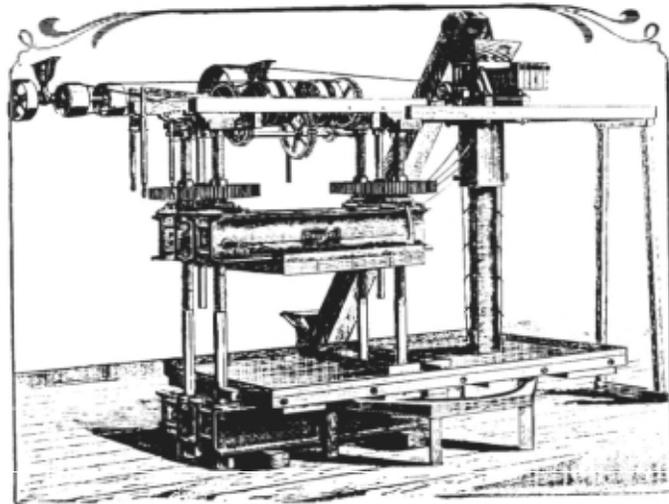
Boomer and Boschert Press Company of Syracuse, New York. From Boomer and Boschert, he also bought the required accessories: an apple grater, an apple elevator and a cider pump. As was their practice, Boomer and Boschert also furnished the plans for the building. From his experiences as a teamster, Mr. Clyde decided to use a 10 H.P. Olney and Warren center crank steam engine and boiler as the power source. Local craftsman constructed the building. Boomer and Boschert sent technicians to oversee the machinery installation.

The mill has stayed in Mr. Clyde's family. It is currently owned and operated by his grandson, Old Mystic native John K. Bucklyn.

Technical Background

The method for making apple cider has changed little over the centuries. The apples including skin, seeds, and core are reduced to pomace (a mix of small pieces of apple) by crushing, cutting, grating or grinding. The pomace is pressed to extract the juice which is transformed to cider by natural fermentation.

In Clyde's mill, the pomace is laid up in a "cheese" prior to placing under the press for juice extraction. The cheese is made using racks, a form, and press cloths. Clyde's rack is a 4' 10" square wood structure consist-



ing of 72" wide x 3/8" thick slats placed side by side with a 7" gap between them. A second layer of slats 1 3/8" wide x 1/2" thick is placed side by side 1/4" apart on top, perpendicular to the first layer. These two layers are tacked together at each intersection to form the rack. The form is a square wood frame about 3 1/2" deep, but with inside dimensions slightly smaller than the rack. The form is placed on top of the rack. A 96" square press cloth is placed in the form with a corner overlapping each side. Pomace drops down from the chute into the press cloth lined rack and form. Once the form is filled, the cloth is folded over the pomace. The form is removed and the process is repeated with another rack, form and press cloth until the desired number of layers is reached. The series of racks and pomace in the press cloths form the cheese.

The mechanical engineering aspect of cider making is found in the evolution of the machinery used to perform the required tasks. One of the earliest methods required the individual to place apples in a circular trough and roll heavy stones over them. The early cider presses were constructed by the farmer. A large wooden screw was attached to the frame at the top. An opening was made at the bottom so a pole could be used to help turn the screw [Orton].

In the latter half of the 19th century, presses were manufactured and sold to farmers for cider and wine making. The early presses were of the screw type. Later, hydraulic presses became more common. Manufacturers also made devices to crush and grind the apples into pomace.

In 1874, Boomer and Boschert Company was founded to produce presses and their accessories for wine and cider making. Their first press was a knuckle joint press, which is similar in operation to a modern day automobile scissors jack. Later, they developed screw presses and hydraulic presses. The accessory equipment included the apple elevator, the apple grater, and the juice pump. In 1897, the company also introduced the Becker pomace chute. This unique, telescoping chute allowed the cider maker to drop the pomace a few inches above each layer, greatly reducing the spillage common to a conventional fixed height pomace chute. Today, Clyde's Cider Mill continues to utilize the No. 2 screw press and the aforementioned accessories.



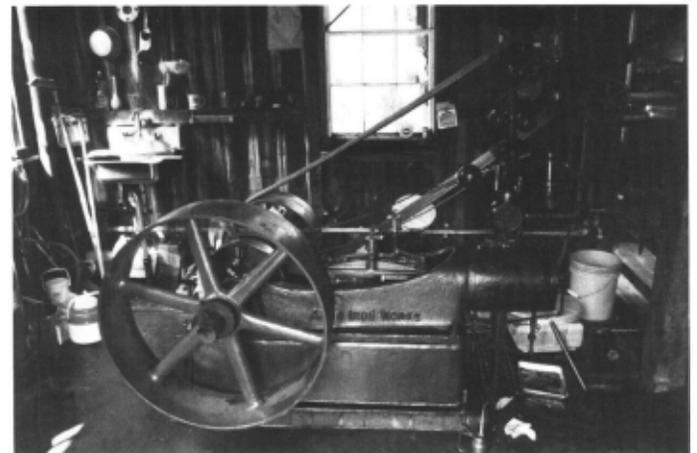
The mill featured a sophisticated method of grinding the fruit and a press capable of applying pressure at three speeds. This model, using all steel construction, was considered the finest screw cider press ever made. In the twentieth century, the hydraulic press came into widespread use. Thus, B.F. Clyde's Cider Mill is representative of the final and finest mills using the mechanical screw press.

Mechanical Specifications

The mill machinery is powered off the single line shaft with appropriately sized pulleys and belts except for the apple elevator which is driven by a specially geared right angle drive off of the line shaft.

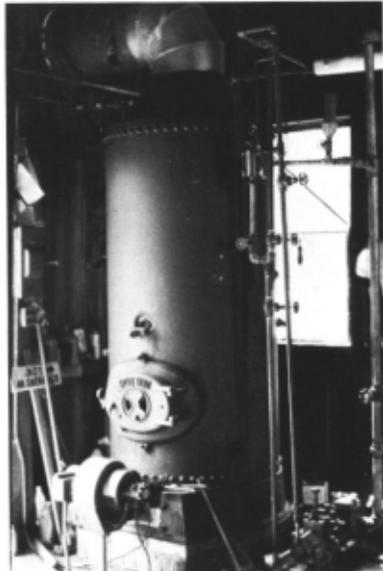
The main elements are:

1. Steam Engine - Ames 15 Horsepower with a Gardener governor. Manufactured circa 1895-1900. Drives line shaft at 250 RPM.

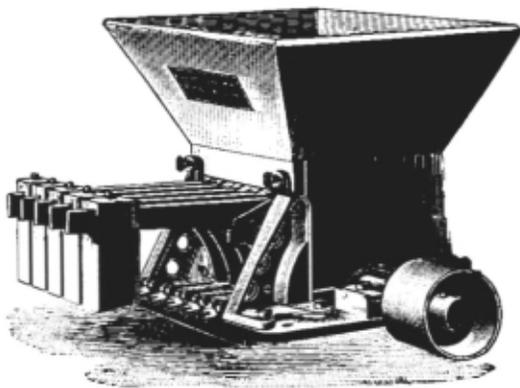


2. Cider Press - Boomer & Boschert No. 2; four 2 1/2" X 3 threads per inch power screws capable of being driven at three different speeds; 4'10" square racks with 96" square press cloths; maximum stroke of 48". Maximum capacity is approximately 10,000 pounds per day (1100 gallons). Manufactured in the mid 1890's.

3. Steam Boiler - Dutton 15 Horsepower fire tube with a riveted shell. Manufactured in 1942.

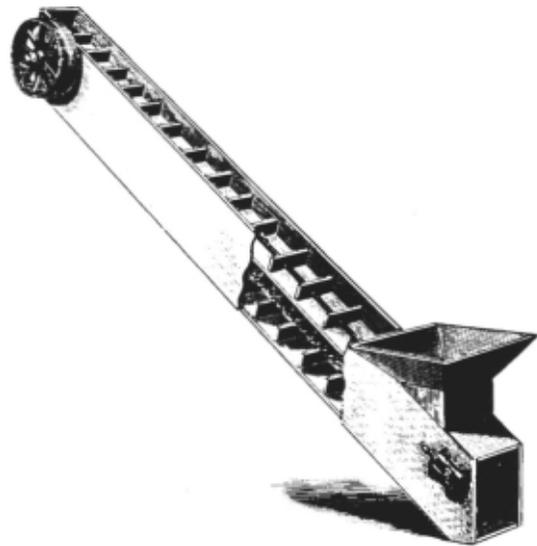


4. Apple Grater - Boomer & Boschert; 10 knives on 1 7/16" shaft rotating at 2000 RPM. Manufactured in the mid 1890's.



5. Cider Pump - Boomer & Boschert; bronze plunger pump, 3" cylinder with 4 1/2" stroke. Runs at not greater than 80 strokes per minute; a capacity of 10 gallons per minute. Manufactured in the mid 1890's.

6. Apple Elevator - Boomer & Boschert; lifts apples from storage up to grater. Lifts up to 20 bushels per minute. Manufactured in the mid-1890's.

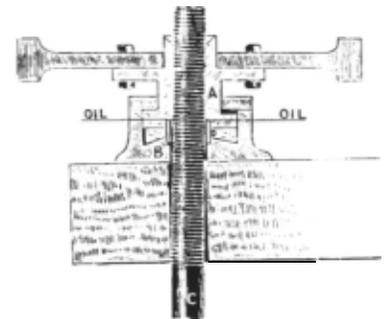


Features of the No. 2 Screw Press

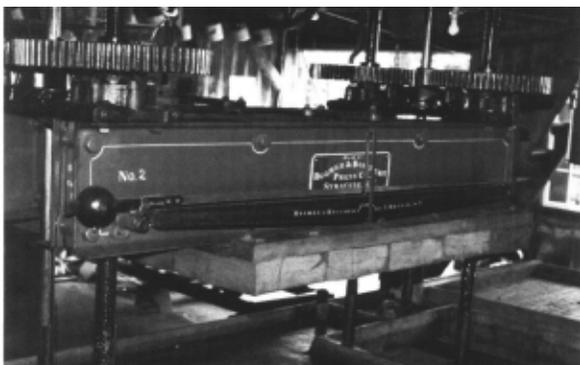
The No. 2 screw press by Boomer and Boschert has a number of innovative features which have extended its usefulness to nearly one hundred years after it was installed. These features include: an invention to reduce friction between the screws and washers, a mechanical "strain gage", and a three speed drive.

The screw is attached to the overhead frame by means of a spur gear nut and washer. The frame bends when cider is being pressed from the apples causing the nut to bend and bind on the screw. To eliminate this problem, Boomer and Boschert invented a mechanism which allows the nut to bend with the head beams. The Boomer and Boschert catalog describes the invention as follows:

The spur gear nut A is separated from the washer B by the self-adjusting concave washer D. The convex portion of B is the exact segment of a globe, and D turns with the nut or remains stationary, the nut turning on top of it. It is made with sufficient play to allow it to conform to any spring or warp of the head beams and still maintain the nut A in its proper position, rendering it impossible to bind or cramp on the screw.



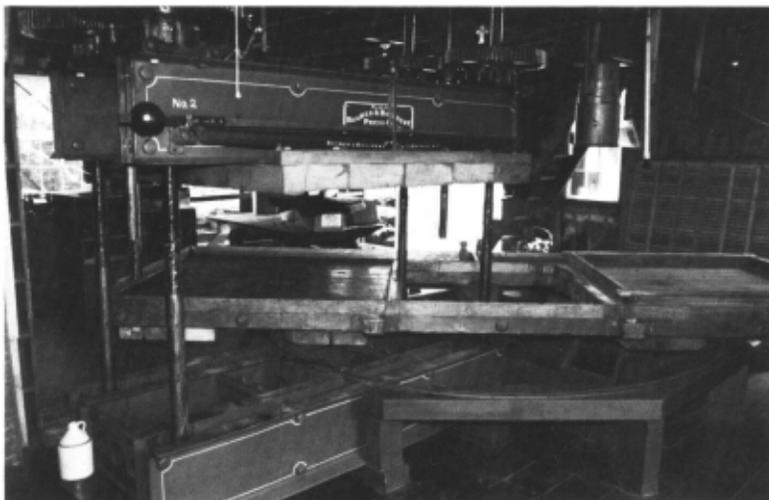
The indicator or “strain gage” consists of a slender pointer attached to the upper steel press beam. The indicator is attached at one end by means of a screw and supported in the middle by a bolt. Above the attached end is a scale which indicates the relative amount of load being applied to the beam. Since the press is manually operated, the operator can quickly determine how much pressure is being applied by the press.



A three speed drive has been incorporated in the design of the press to insure that as much juice as possible is squeezed from the apples. According to their catalog, “This (the three speed drive) enables the operator to run down until the head strikes the cheese; then shift to the medium motion, until the bulk of the cider is extracted, and to finish on the slow speed, the power [force] increasing as the speed decreases.”

Operation of the Press

The process begins by placing the apples in the storage structure. From storage, apples are washed and transported up to the second story of the mill building where they are dropped into the grater. The grater turns apples into pomace which falls through the telescoping chute to the first layer of the cheese on the press table. After the cheese has been prepared, the table is rotated 180 degrees to place the end with the cheese under the press. Each end of the table is capable of carrying a cheese. Thus, while the first cheese is being pressed, another cheese can be laid up. This feature minimizes the down time of the press.



The press is started and cider is squeezed from the cheese. The cider is channelled into a hole in the press table and then into the press hold tank. From the press hold tank, it is pumped into the main hold tank where it is dispensed into the cider containers.

References

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Orton, Vrest. *The American Cider Book - The Story of America's Natural Beverage*. Farrar, Straus and Giroux: New York, 1973.

Cider and Machiner - Catalogue No. 54. The Dunning & Boschert Press: Syracuse, New York, 1954.

Acknowledgements

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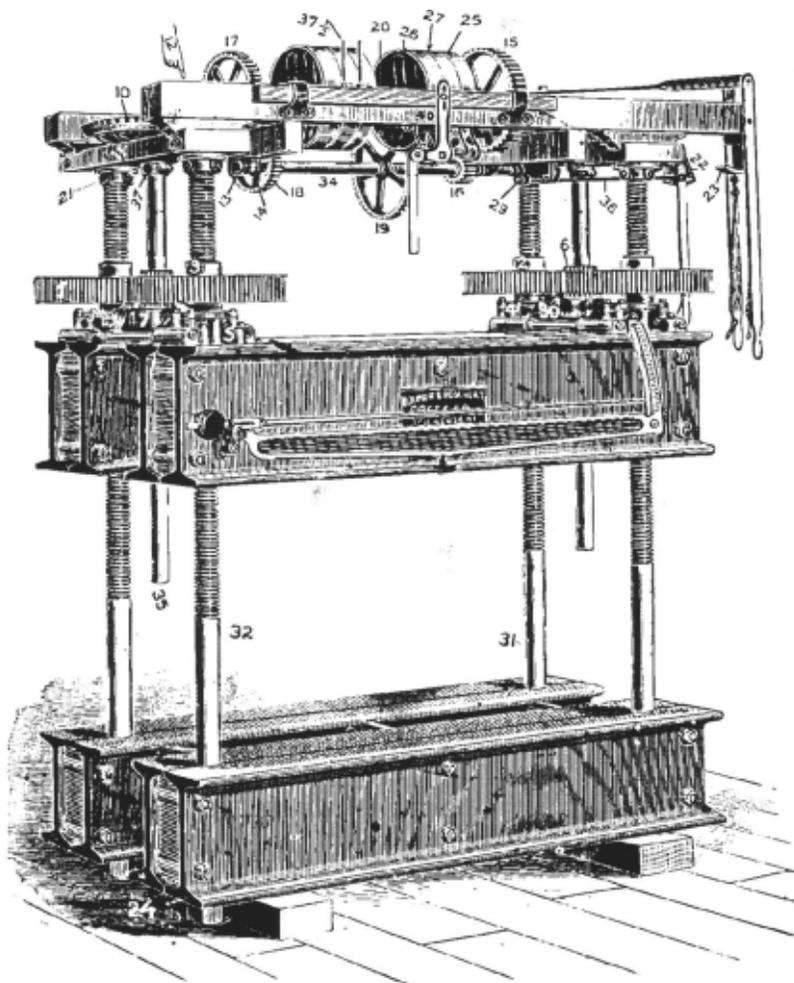
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An ASME landmark represents a progressive step in the evolution of mechanical engineering. Site designations note an event or development of clear historical importance to mechanical engineers. Collections mark the contributions or a number of objects with special significance to the historical development of mechanical engineering.

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1. Large spur gear on screws.
2. Right hand thread screw nut.
3. Left hand thread screw nut.
4. Head socket washer.
5. Cover for same.
6. Spur pinion sliding on upright.
7. Yoke.
8. Split collar on pinion.
9. Brass washer between split collar and yolk.
10. Large bevel gear.
11. Bearing for same.
12. Bevel pinion.
13. Shaft boxes.
14. Cap for same.
15. Large spur driving gear.
16. Pinion to match.
17. Medium spur gear, upper shaft.
18. Pinion to match, lower shaft.
19. Large center spur gear.
20. Long center pinion.
21. Top casting on screws.
22. Lever quadrant.
23. Double lever quadrant.
24. Lower screw washer.
25. Pulley, fast to shaft.
26. Pulley fast to long center pinion.
27. Pulley loose on shaft.
28. Bronze plano concave washer under nut.
29. Fork for shifting lower shaft.
30. Yoke box.
31. Screw - right hand thread.
32. Screw left hand thread.
33. Upper shaft.
34. Lower shaft.
35. Upright end shaft.
36. Rod for shifting lower shaft.
37. Collar on end shafts.
- 37½. Finger for shifter.
38. Loop for shifter.
39. Bracket for self-shifter.
40. Bell crank for self-shifter.
41. Shifter bar bracket.

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B.F. Clyde's Cider Mill

Owner	John Bucklyn
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NATIONAL HISTORIC MECHANICAL ENGINEERING LANDMARK B.F. CLYDE'S CIDER MILL 1898

CLYDE'S MILL IS A RARE SURVIVOR OF A ONCE-COMMONPLACE SEASONAL RURAL INDUSTRY. UNTIL WELL INTO THIS CENTURY A CIDER MILL COULD BE FOUND IN EVERY COMMUNITY WHERE APPLES WERE GROWN, IN THE FALL CONVERTING THE FRUIT OF THE ORCHARD INTO DRINK EVEN AS THE GRIST MILL CONVERTED THE GRAIN OF THE FIELD INTO FLOUR.

THE MACHINERY AT CLYDE'S - FOR ELEVATING THE APPLES TO THE GRINDER, FOR GRINDING THE APPLES INTO PULP, AND FOR PRESSING THE PULP INTO CIDER - WAS MANUFACTURED BY PRESS-BUILDER BOOMER & BOSCHERT OF SYRACUSE, NEW YORK ALSO DESIGNER OF THE BUILDING.



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