

GRIST MILLS OF EARLY AMERICA & TODAY

By Joanne Cox

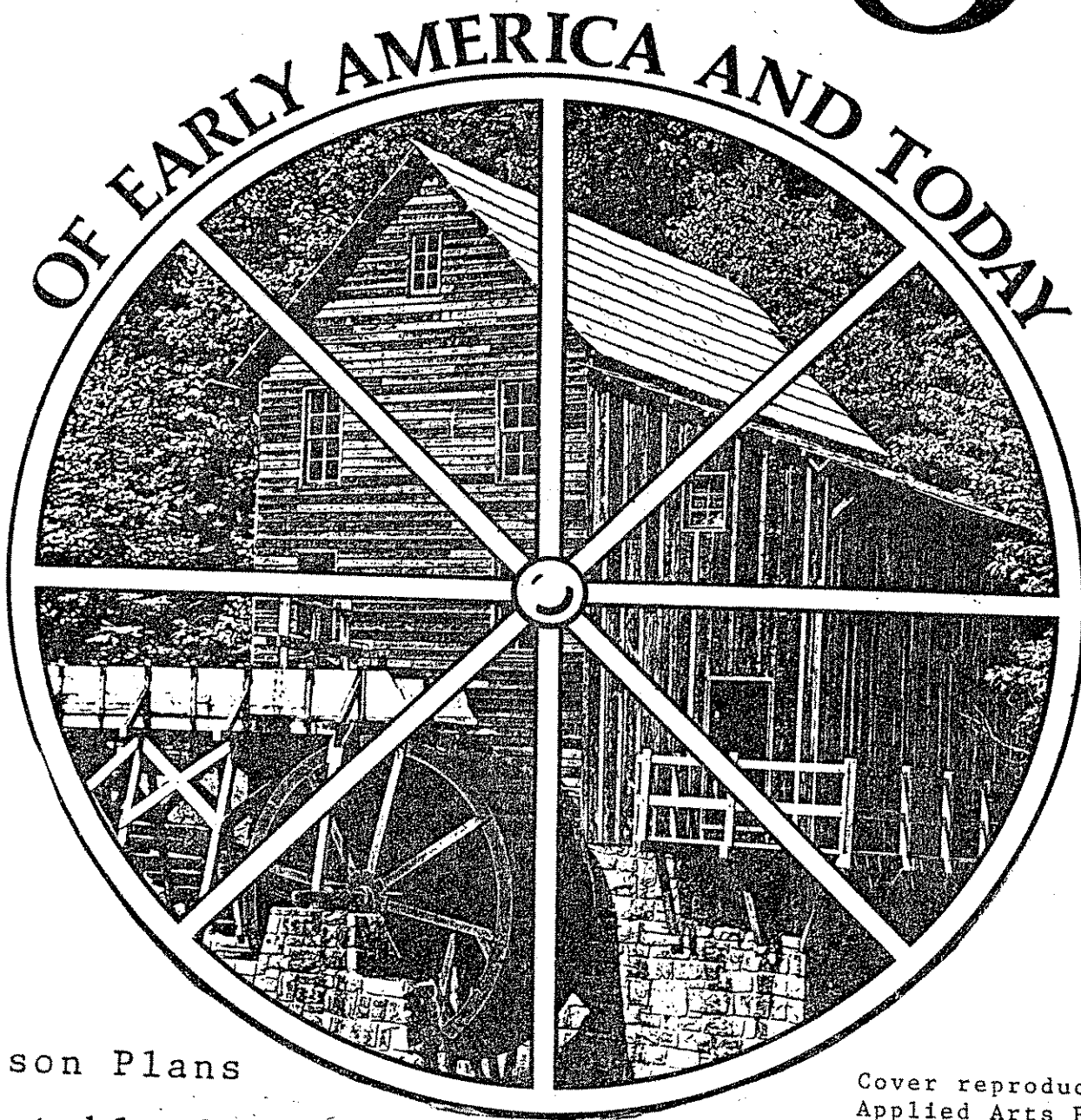
GRADE LEVEL: Elementary

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GRIST MILLS



Lesson Plans

Adaptable for Grades 1-8

By Joanne F. Cox

Cover reproduced
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Statement of Purpose

These lessons are designed to be adapted for many grade levels. Some puzzles are included for the primary and for upper grades. The vocabulary list is lengthy in order to be able to choose what is appropriate.

Much of the information is in the research paper. Extra informational articles are included in this unit to expand it for classroom use.

A northern and a south central millsite were chosen for their accessibility and distinctiveness. Brochures are available for classroom use from these parks.

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LESSON PLAN OBJECTIVES

1. Student will experience the difficulty of grinding corn by hand.
2. Student will be able to explain how a waterwheel turns the mill machinery.
3. Student will be able to explain the mill machinery, using the appropriate vocabulary.
4. Student will be able to explain the milling process from grain to flour.
5. Student will be able to identify the four types of waterwheels.
6. Student will be able to identify the grain parts and explain their use in the milling of flour.
7. Student will be able to differentiate between the grains buckwheat, wheat, rye, and corn.
8. Student will examine the three stages of ground wheat, corn, buckwheat, and rye.
9. Student will be able to discuss the importance of the mill in relation to town building in pioneer times.
10. Student will be able to discuss the jobs of the miller.
11. Student will be able to recall the history of Bonneyville Mill or Spring Mill.
12. Student will be able to explain the importance of grain as a food substance during pioneer times and today.

VOCABULARY LIST


1. mill a building with machinery that grinds grain into flour.
2. miller someone who owns or directs work done at a mill, especially a flour mill.
3. millstone one of two large circular slabs of stone with channels, between which grain is ground. The grain is fed into a hole in the middle of the upper one.
4. millrace the strong current of water which drives the mill wheel, the channel in which the current runs.
5. milldam a dam made across a stream to build up a sufficient supply of water to turn a millwheel.
6. millpond the pond formed by a milldam.
7. mill wheel a broad wheel fitted with flanges, which is driven by the millstream and works the mill machinery.
or
waterwheel a wheel rotated by the flow of water and used to work machinery, especially in a mill.
8. millwright a person who builds mills or mill machinery.
9. sluice an artificial waterway with a gate or other device to control the flow and level of the water.
10. undershot a waterwheel driven by water passing underneath it.
11. overshot a waterwheel driven by water flowing over the top of it.
12. breastshot a waterwheel receiving water on its backside driven by gravity and the water.
13. turbine an engine consisting of curved vanes on a central rotating spindle actuated by the reaction of a water current subjected to pressure.

14. flume man-made trough or channel which carries water from the head race to the point where it strikes the waterwheel
15. pinstock tub encasing the turbine
16. shaft a long rod supporting a part of a machine or transmitting motion to a part of a machine.
17. gear a device for connecting the moving parts of a machine, usually by the engagement of toothed wheels, so that the speed of rotation of one part causes a different speed if rotation of another part.
18. beveled gear a gear whose teeth lie at an angle to the adjoining gear.
19. belt an endless band connecting wheels or pulleys to run machinery.
20. pulley a wheel on a fixed shaft used to transmit power by means of a belt passing over its circumference.
21. elevator leg an enclosed wooden box encasing the conveyors, these legs branch to convey grain wherever it is needed in the mill.
22. conveyors a mechanical device used to move grain in the mill, horizontal conveyors used a screw type shaft, vertical conveyors used buckets.
23. bins wooden receptacles for storing grain.
24. sifter a machine that used a series of screens to separate or strain the finer particles from the coarser.
25. dressing the stones sharpening the millstones, this involved using tongs to hoist the top millstone off and turn it up so both surfaces could be sharpened.

26. hopper a wooden container wider at the top and narrow at the bottom which delivers its contents to something below.
27. grain the seed of cereal plants such as wheat, corn, rye, buckwheat.
28. flour finely ground grain meal
29. cornmeal a meal made from corn, not as finely ground as flour.
30. cornbread bread made from cornmeal, usually eaten hot.
31. cornpone cornbread made without milk or eggs, a pioneer food.
32. johnnycake fried bread made from cornmeal, a popular pioneer food.
33. buckwheat a seed made into flour. The USSR and USA are the biggest producers.
34. rye a cereal grain made into flour and for distilling rye whiskey. N. Europe and N. America produce it.
35. corn a cereal grain ground into flour and meal, a very important food source for the pioneers and today.
36. wheat a cereal grain ground into flour, major source of breadstuff.
37. bran the outer covering or husk of a grain kernel.
38. endosperm the starchy inner part of a grain kernel that is the source of food for the young plant. The part that is milled for white flour.
39. germ the inner part of a grain kernel that sprouts into a new plant. It contains oil.
40. gluten an elastic protein substance in grain giving consistency to dough.
41. mortar and pestle a bowl made of a strong material in which a substance is pounded and ground.
a blunt ended implement for pounding in a mortar.
42. quern mill a hand mill for grinding grain.



WRITING TOPICS

1. Pretend you are a kernel of grain and trace your life from the field to a loaf of bread.
 2. Write a story about a pioneer boy who walked to the mill with a sack of corn to grind. Tell some of the things that happened to him on the way, what he did while he was waiting for his corn to be ground, and about his trip back home.
 3. Pretend you are a pioneer boy or girl whose father is a miller. Tell all the things your father has to do at the mill to keep it running. Tell some of the problems that he has and some of the advantages of being a miller's family.
 4. Look in your phone book and find how many Millers there are. Write a story about how people got their last names.
 5. Write a story about a town developing in pioneer times. Give the town a name. Start with a mill being built. Tell why this location was chosen. Add a general store, blacksmith, and several other businesses. Tell of some problems and some things that worked out good.
 6. Find recipes of pioneer foods. Include things made with grains. Try one and bring in a sample.
 7. List the Four Basic Food Groups. Categorize pioneer foods under the appropriate ones and write about the nutrition of the pioneers.
 8. Research and list the products of wheat, rye, corn, and buckwheat today. Compare that with pioneer products.
 9. Research the types of grinding stones used since early man. Compare and contrast the different types.
 10. Research your town and find out where there were mills and why those locations were chosen. Find out what kinds of waterwheels were used.
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HANDS ON EXPERIENCES

1. Grinding Corn - Get some corn and allow the children to grind it by hand using a mortar and pestle type set up.
2. Examine the Stages of Grinding - Get packets of corn: whole, cracked, meal and flour. Also buckwheat, wheat, and rye.
3. Labels of Products - Have students bring in labels or magazine pictures of today's products made from the grains studies.
4. Waterwheel - Using tinkertoys or other building materials to construct waterwheels and try them in tubs of water.
5. Mill Machinery - Using tinkertoys or other building materials construct the shafts and gears that transfer power from the waterwheel to the millstone.
6. Cook or Bake Pioneer Food - Use cornmeal, etc. to make johnnycakes, mush, or some types of pioneer foods. Have a tasting party.
7. Visit a Working Mill - Take a field trip to Bonneyville, Spring Mill, or Metamora.

THE GRAIN KERNEL

A kernel of wheat contains three parts. The outer covering is called the bran. Inside is the endosperm and the germ. The endosperm is the source of food for the plant, while the germ is the part that sprouts into a new plant.

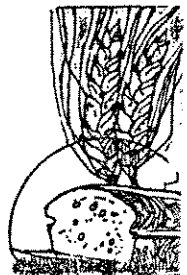
Flour is made from all or parts of the kernel. Whole wheat or graham flour is made from all parts of the kernel. White flour is made from only the endosperm of the kernel. Bran is removed because of the dark color it gives the flour. Germ is removed because it contains oils that will spoil the flour. However, nutritionists have found that the bran and germ are healthy and a necessary part of the diet. More of these kinds of flour and breads are being produced in recent years.

Different types of wheat produce a variety of flours used in making and baking products. Bread making flour needs a high percentage of protein so that when yeast is added to it, it will rise. Gluten in the flour causes it to stretch so that gas is trapped in it and the dough rises. The strong wheats used for bread are hard red spring wheat, hard red winter wheat, and hard white wheat.

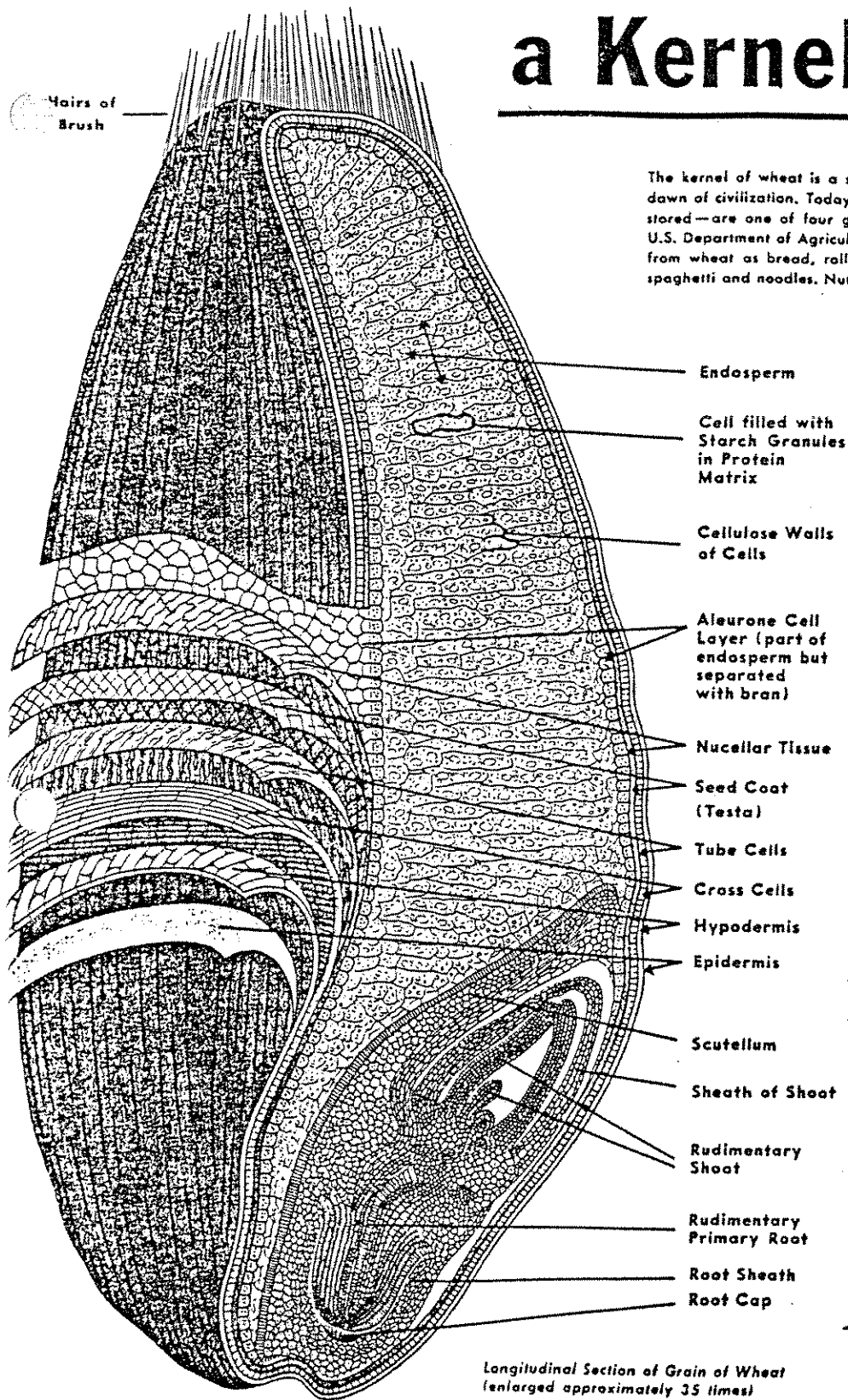
Wheat with less protein is used for biscuits and crackers.

The third type of flour is used for cakes and pastries. Soft red winter wheat and white wheats are used for this.

Corn also has three main parts in the kernel: hull, endosperm, and germ. The endosperm is the only part that is ground. The three sizes ground are the coarsest for hominy grits, corn meal for bread, cornpone, and johnnycakes, and corn flour for pancakes, tortillas, and other baked products.



a Kernel of Wheat



Longitudinal Section of Grain of Wheat
(enlarged approximately 35 times)

As a product group in the U.S. Department of Agriculture's recommended Daily Food Guide for good nutrition—bread, flour and cereals make a generous contribution to human requirements for the B-vitamins—thiamine, niacin and riboflavin—and the mineral, iron. They also help fill daily needs for protein and calcium. The other three food groups are: milk and milk products; meats, poultry, fish,

eggs and dry lentils; fruits and vegetables. Nutritionists advise eating a variety of foods from each of the four groups every day to obtain all the nutrients necessary for adequate diet. With fresh, frozen, canned and prepared foods readily available, it is easy for everyone to satisfy nutritional requirements by following the Daily Food Guide.

The kernel of wheat is a storehouse of nutrients needed and used by man since the dawn of civilization. Today's bread, flour and cereals—enriched, whole grain and restored—are one of four groups of food recommended for optimum nutrition by the U.S. Department of Agriculture. This popular, low-cost group includes such foods made from wheat as bread, rolls, biscuits, muffins, pancakes, breakfast cereals, macaroni, spaghetti and noodles. Nutrients listed below are considered essential in human diet.

ENDOSPERM

... about 83% of the kernel
Source of white flour. Of the nutrients in the whole kernel the endosperm contains about:⁽¹⁾

70-75% of the protein	} B-complex vitamins
43% of the pantothenic acid	
32% of the riboflavin	
12% of the niacin	
6% of the pyridoxine	
3% of the thiamine	

Enriched flour products contain added quantities of riboflavin, niacin and thiamine, plus iron, in amounts equal to or exceeding whole wheat—according to a formula established on the basis of popular need of those nutrients.

BRAN ... about 14 1/2% of the kernel

Included in whole wheat flour but more often removed and used in animal or poultry feed. Of the nutrients in whole wheat, the bran, in addition to indigestible cellulose material contains about:⁽¹⁾

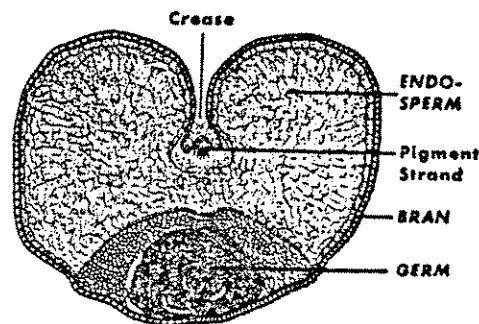
86% of the niacin
73% of the pyridoxine
50% of the pantothenic acid
42% of the riboflavin
33% of the thiamine
19% of the protein

In animal and poultry feeds, these nutrients are available. In human diet, the cellulose material of the bran tends to speed the passage of food through the digestive tract—making the total nutritive contribution less than from enriched white flour products.

GERM ... about 2 1/2% of the kernel

The embryo or sprouting section of the seed, usually separated because it contains fat which limits the keeping quality of flours. Available separately as human food, but usually added to animal or poultry feed. Of the nutrients in whole wheat, the germ contains about:⁽¹⁾

64% of the thiamine
26% of the riboflavin
21% of the pyridoxine
8% of the protein
7% of the pantothenic acid
2% of the niacin



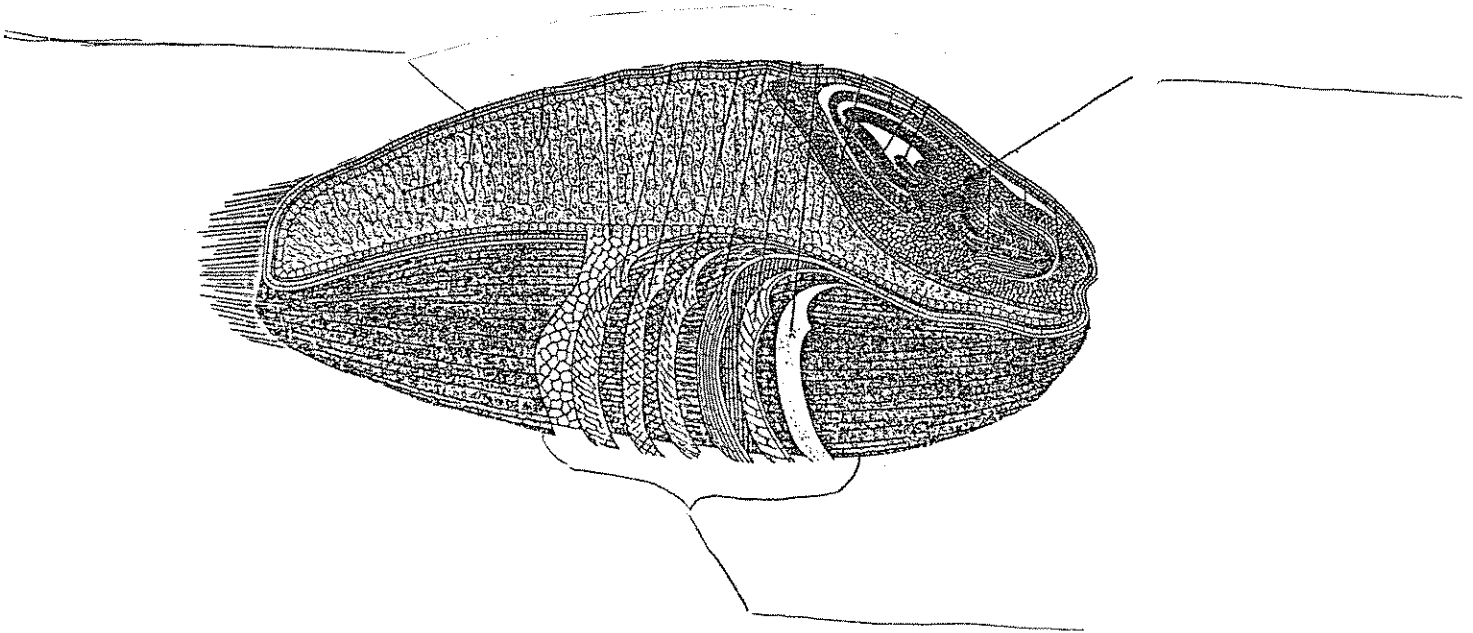
Cross Section View

⁽¹⁾Research Association of British Flour Millers, Cereals Research Station, St. Albans, England, 1960.

THE KERNEL OF GRAIN

Label the parts of the kernel of grain.

Write the definition of each part below.



Endosperm _____

Bran _____

Germ _____

GRAIN

Match the word with the correct definition

- | | | | |
|--------------|----------|-------------|---------------|
| a. grain | d. rye | g. miller | j. germ |
| b. buckwheat | e. wheat | h. cornmeal | k. endosperm |
| c. corn | f. flour | i. bran | l. johnnycake |

- _____ 1. A cereal grain made into flour and used for making dark European bread.
- _____ 2. Grain ground very fine, used to make food.
- _____ 3. A cereal grain ground into meal and flour, eaten daily by the pioneers.
- _____ 4. A meal ground from corn, not as fine as flour.
- _____ 5. The outer layer of a kernel of grain.
- _____ 6. The seed of cereal plants such as wheat and corn.
- _____ 7. A three sided seed, ground and used for pancakes.
- _____ 8. The most nutritious part of a grain, the part that sprouts into a new plant.
- _____ 9. Fried bread made from cornmeal, a popular pioneer food.
- _____ 10. The major grain used in bread making.
- _____ 11. The starchy inner part of a grain kernel that is milled for white flour.
- _____ 12. The person who operates a mill.

GRAINS GROUND IN GRISTMILLS

Wheat, rice, rye, buckwheat, and corn are the chief grains that are milled for flour. The grains being discussed in this teaching unit are wheat, rye, buckwheat, and corn.

In North America and western Europe, wheat flour is most widely used. Rye flour is popular in northern Europe, and buckwheat flour is used in large quantities in the Soviet Union. (1)



In many countries flour is a basic food substance.

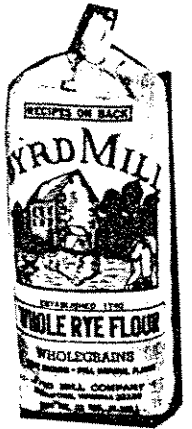
Bread ranks as the world's most widely eaten food, and people in many countries receive more than half their nourishment from foods made with flour. Each person in the United States eats an average of about 125 pounds of flour from wheat and other grains annually. (2)

Corn is the most valuable crop grown in the United States today. It ranks as one of the four most important crops in the world with wheat, rice, and potatoes. The Indians all over the United States and Canada were growing all kinds of it when Christopher Columbus discovered America in 1492. They showed the early European settlers how to grow corn. It became extremely important to the life of the pioneers and in some instances kept people from starving. (3)

Corn and meat were the basic foods of a pioneer family. The family ate corn in some form at almost every meal. The pioneers raised corn as their chief crop because it kept well in any season, and could be used in many ways. After the corn had been husked, the kernels could be ground into corn meal. The settlers used the meal to make mush, porridge, or various kinds



of corn bread-ashcake, hoe cake, johnnycake, or corn pone. For a special treat, ears of corn were roasted. (4)



Corn was also used to make liquor.

Buckwheat is a plant grown for its three sided seeds which are ground into flour. It is not a relative of the grass family which includes wheat and corn, but it is considered a grain. Most of it is used in mixtures for making pancakes. "In the 1860's the United States produced 23 million bushels of buckwheat. At present, only about 4 million bushels are produced annually." (5) It is grown mainly because it is so hardy and has a high tolerance to pests and diseases.

Rye, another cereal grain, has nearly as great a food value as wheat. It is ground into flour and used chiefly for bread. It is used more in European countries than in the United States. Because the rye contains less gluten than wheat, the bread does not raise as much thus causing the rye bread to be more heavier. Americans add a lot of wheat flour to the rye flour so it is not so dark. It is also used to make liquor.

Thousands of years ago B.C., people ground wild grain between stones. When farming began in 8000 B.C., cultivated grain was ground this same way. By 1000 B.C. two flat millstones were used to grind grain. Domestic animals and slaves were used to turn the stones until wind and water power

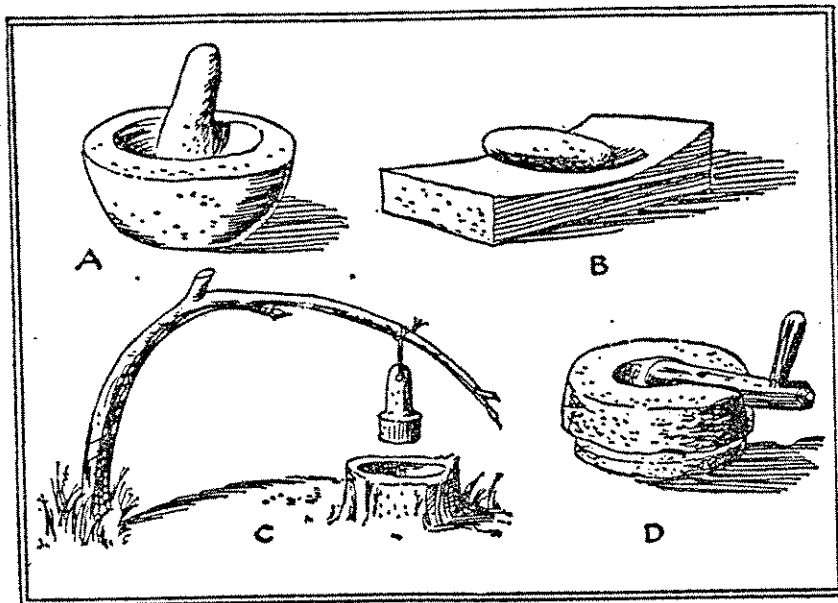
were harnessed to do the job.(6)

After that came steam powered milling, then metal rollers replaced millstones. Automation increased production and then came electrical power. "Today the United States has more than 250 flour mills which produce 12 million tons of flour annually."(7)

FOOTNOTES

1. The World Book Encyclopedia, Worldbook-Childcraft International, Inc., Chicago, 1979, Volume 21, p. 159.
2. World Book, Volume 7, p. 232.
3. World Book, Volume 4, p. 843.
4. World Book, Volume 15, p. 433.
5. World Book, Volume 2, p. 553.
6. World Book, Volume 7, p. 233.
7. Ibid., p. 233.





Saddlestone

Some simple grist mills: (A) stone mortar and pestle; (B) saddlestone and metate; (C) sapling-and-stump type of mortar and pestle, often used by early colonists; (D) Roman quern.



Quern

The Millstone's development was slow

Pounder

tree joint
tree stump

1620

Sapling Mill

1650

SCOOP FILLS, THEN EMPTIES.

1700

then the *Plumping Mill.*

The round millstone was first used in the "Quern" turned by hand

GRAIN →

FLOUR →

in a
Quern mill

1750

1800

Horse-powered millstone.

and finally the Powered millstones

MIDLINGS

by Michael LaForest

I thought it might be interesting to prepare a brief outline of some of the major technological milling advances made up to the nineteenth century. This information has been supplied from various sources — primarily, "The Story of Man's Bread", by Storck and Teague.

- 75,000 BC — earliest known grinding stones; small, hand held, flat rocks
- 25,000 BC — Magdalenian culture in France uses mortar/pestle
- 6,700 BC — Einkorn, the common ancestor of all wheats, is found cultivated in Iran
- 4,000 BC — Grain kilns used by Egyptians to dry grain before grinding
- 3,000 BC — Egyptians are using saddle stones with scored surfaces to facilitate the grinding process
- 2,500 BC — Egyptians are sifting meal and using gradual reduction to grind grain
- 1,000 BC — Greeks invent lever mill with definite furrows set in an angular pattern and a grain hopper; hour glass mills used which were the first to provide a continuous circular motion
- 800 BC — Water canals in Asia Minor thought to have powered quern mills
- 500 BC — Greeks are using animals to power mills
- 400 BC — Aristotle explains the theory of gearing
- 19 BC — Vitruvius, a Roman, describes undershot waterwheels to turn millstones; Romans are eating a raised bread (although it still sinks in water)
- 536 AD — Belisarius devises a floating mill barge powered by the water current
- 550 AD — Persians thought to have first used windmills
- 8th Cent — Irish use "tub wheels" with a vertical shaft
- 1000 AD — Tide mills used in England
- 15th Cent. — Stationary windmill with revolving cap
- 16th Cent. — breast wheel devised
- 1502 — Boller describes a mill-powered device (as opposed to manually powered) to shake sieves for bolting flour
- 1550 — Cardan describes a manual sciving device permitting four operations simultaneously
- 1578 — Besson describes the "tub" mill principle operating on water impulse
- 1588 — Ramelli invents a hand powered cylindrical bolter and roller mill
- 1605 — French build a water powered mill in Nova Scotia; the first recorded mill in North America
- 1629 — Branca develops a mill using two corrugated rollers together with a device for sifting the meal
- 1737-53 — Bernard Forest de Belidor suggests first water wheels with curved blades
- 1782-5 — Oliver Evans builds first all automatic mill on Red Clay Creek, a few miles west of Wilmington, Delaware
- 1784 — Steam engine successfully used at Albion Mills, London, England

- 1793 — Charlemagne invents cylindrical bolter rotated by power drive
- 1795 — Oliver Evans publishes, "The Young Millwright and Millers Guide"
- 1807 — The first purifier invented by Paur, an Austrian; air blasts are used to separate flour grades causing great problems including increased dust and explosions
- 1820 — Bolting cloth first manufactured in Switzerland
- 1822 — Claude Burdin coins the phrase water turbine from the Latin word "turbo"
- 1824 — Poncelet undershot wheel is invented
- 1827 — Fourneyron develops the first efficient turbine using a combination of impulse and reaction principles
- 1834 — The Muller Mill in Frauenfeld, Switzerland, is first mill to have successfully used rollers. Rollers designed by Sulzberger in 1834.
- 1835 — H. Bodmer invents and manufactures silk bolting cloth
- 1840 — U.S. Federal Census lists 23,661 small, toll mills serving a population of 17 million people
- 1855 — Cabanes patents mechanical sieve whereby air is passed under a screen to assist in the separation process
- 1862 — James Leffel establishes turbine manufactory at Springfield, Ohio. James B. Francis (1815-92) develops the inward flow and mixed flow turbine runner which is the most popular design used by today's modern turbines
- 1865 — Edmund LaCroix constructs the first midlings purifier in the United States
- 1870's — The "new process" or "high grinding" fashion begins and lasts about 12 years (before 1870, the American, or low grinding process was in use - see OMN Oct. 1980); the average mill employs about 3 persons
- 1873 — Northwester Miller published in Minnesota, and The American Miller, published in Chicago, were founded
- 1877 — Lester Pelton develops the high speed Pelton Wheel for use in mining (sometimes called the Hurdy Gurdy); John and William Sellers build the first American, all roller, gradual reduction mill on the Wissahickon River in present day Fairmount Park, Philadelphia, Penn. The mill was a failure.
- 1880's — beginning of the present day roller milling era which originated in Hungary; the Cincinnati Milling Exposition
- 1883 — Cornflakes introduced to consumers
- 1886 — Plansifter invented by Carl Haggemacher; O.M. Morse patents the cyclone dust collector
- 1887 — First all electric flour mill built in Laramie, Wyoming
- 1900 — U.S. Federal Census lists 15,782 small toll mills serving 76 million people
- 1976 — About 70 major milling companies operating 200 mills serve over 200 million people

OLIVER EVANS

Oliver Evans is credited with the development of milling technology which revolutionized the industry. His was the first automatic system in which wheat was milled into flour in one continuous operation. This was the first continuous automatic production line in the industrial history of America.

He was born in 1755 in Delaware and experimented with mechanical ideas all his life. Among the many things he invented were five milling innovations: the bucket elevator, the screw conveyor, the hopper boy, the drill, and the descender. These are all explained in his very detailed book entitled, *The Young Mill Wright and Miller's Guide*, published in 1795. When this book appeared in Philadelphia it was considered a landmark in the history of American Milling. This book

freed millowners and millwrights from complete dependence on the traditional lore and practice and such misconceptions and errors as these might sanction. It provided millwrights with a rational basis for the planning and design of water mills, together with much practical information for guidance in the actual construction and equipping of such mills.

(Lewis C. Hunter, *A History of Industrial Power in the United States 1780-1930*, Volume I *Waterpower* (Charlottesville, Virginia: University Press of Virginia, 1979) p. 95.)

The improvements that he made included the bucket elevator which lifted grain in bulk, even from the holds of ships. Before this it had to be carried on the millers' backs up

several flights of stairs. Buckets, attached to a strap, filled and emptied themselves.

The screw conveyor allowed grain to be moved horizontally. Previous to this the grain had to be shovelled by hand. The endless screw spirals were encased in a trough through which the grain was driven. It was dropped into a hopper by gravity, which again previously had to be shoveled.

The mechanical hopper boy dealt with clotting of the grain. It was a rotary device with arms full of flights to spread the meal and drop it into hoppers. This saved a lot of time for the miller in having to stop the milling process to unclog the meal.

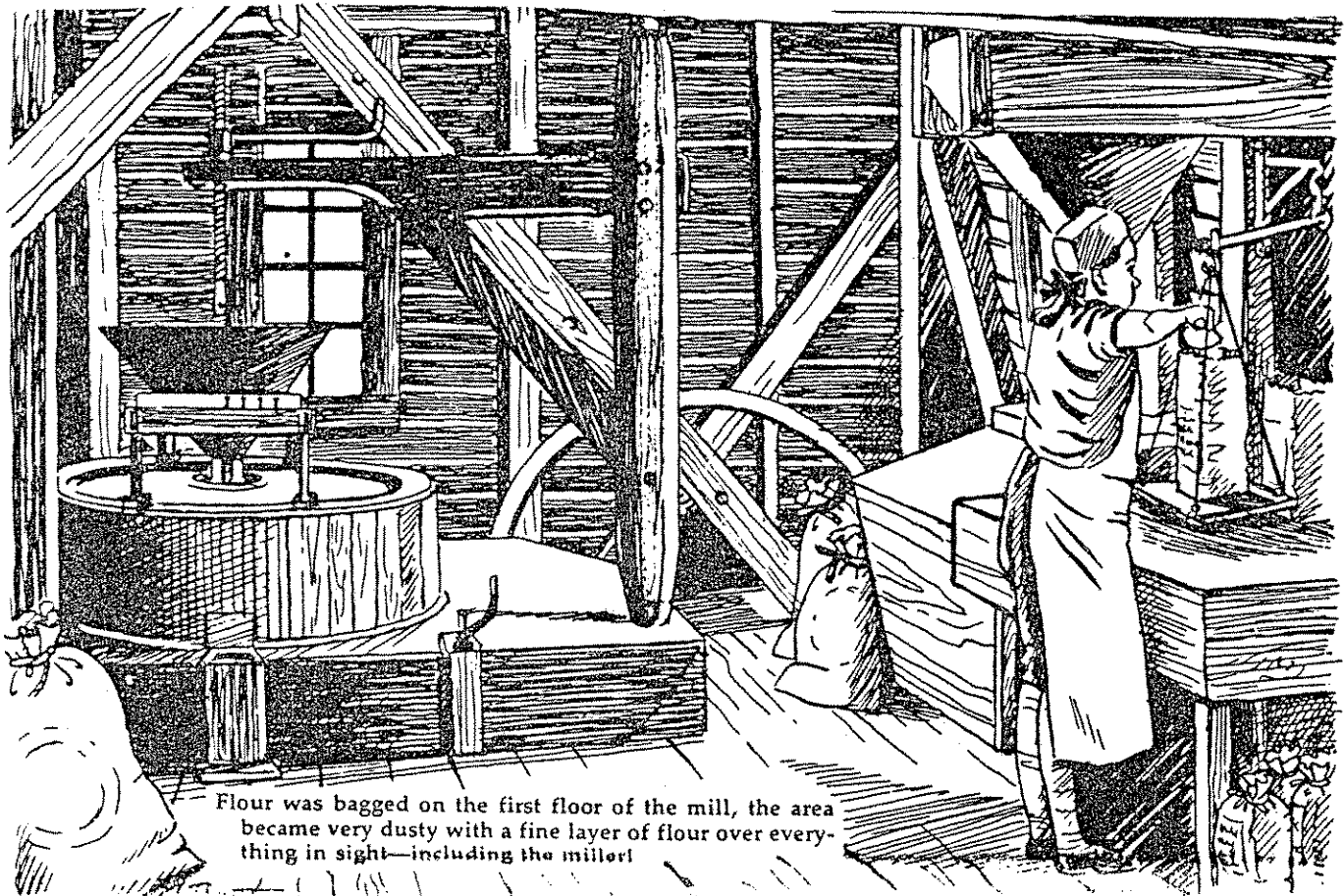
Another horizontal meal mover was the drill. It was a strap with rakes in a case.

The gravity operated descender was a downward pitched belt conveyor. A picture of these improvements is included with this paper.

He created other devices that cleaned, separated, and sifted out the bran to produce a purer, whiter flour.

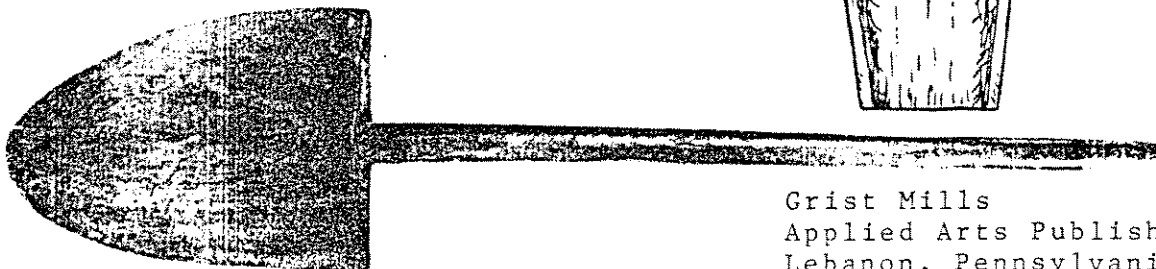
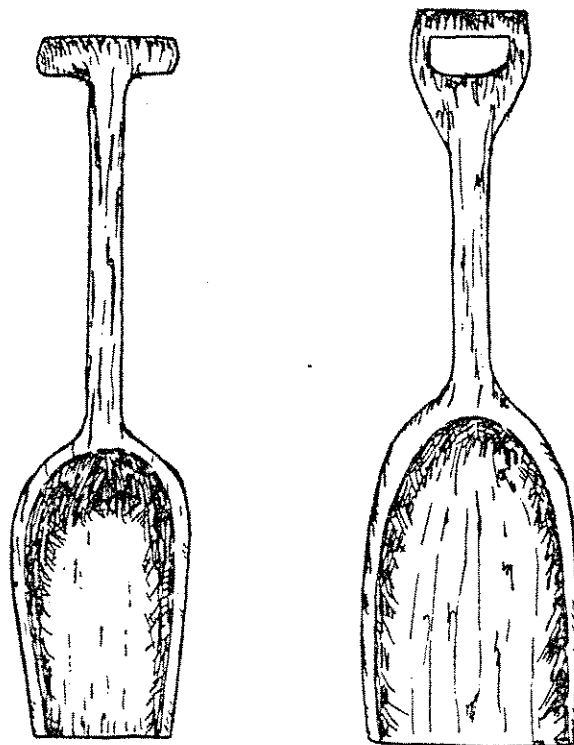
This process was powered by a waterwheel. After these innovations were finally put to use in the early 1800's, milling engineering slowed and did not make any great advances until roller milling in the 1870's.

These inventions and innovations by Oliver Evans set the stage for the industrialization of milling.

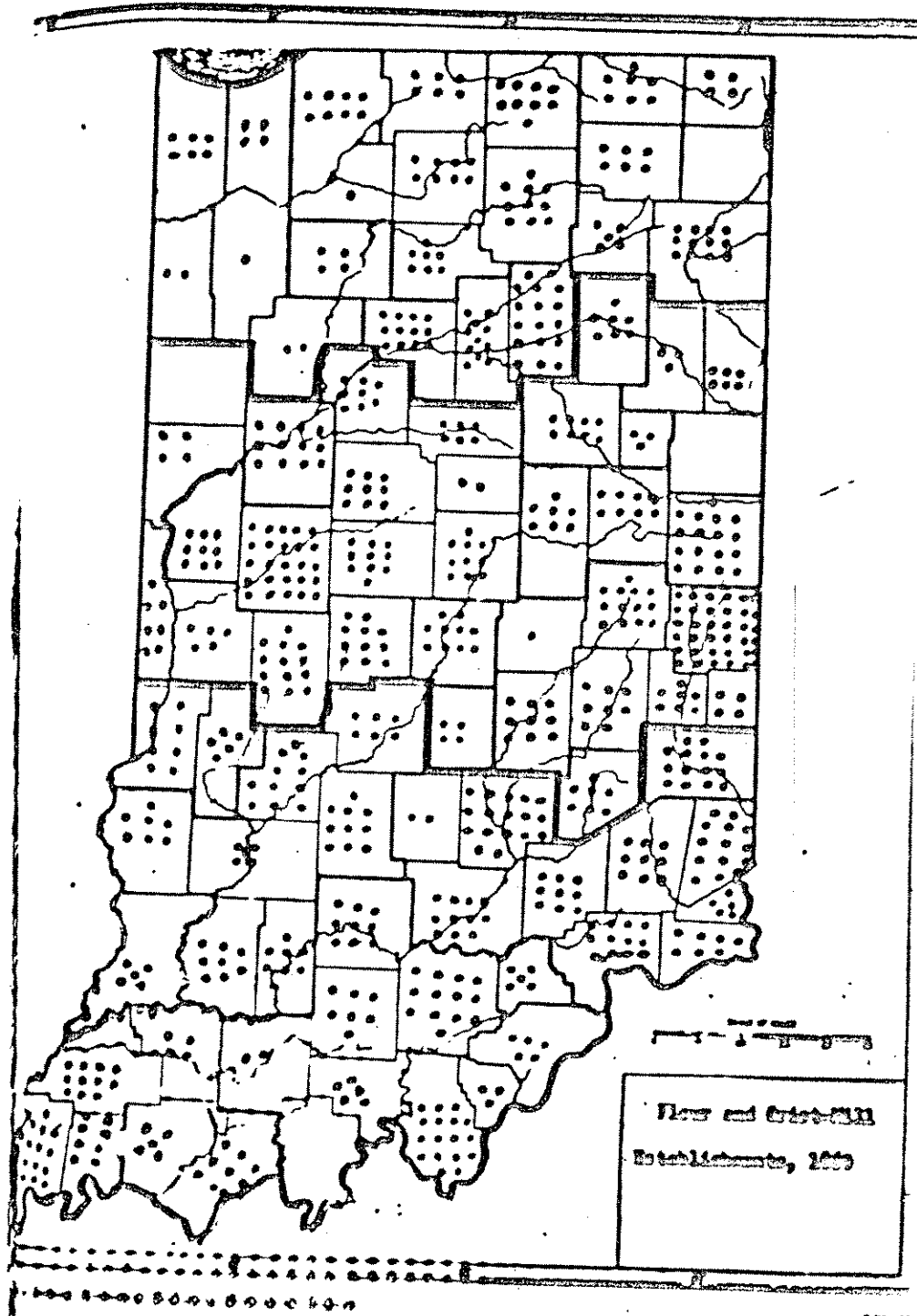


Flour was bagged on the first floor of the mill, the area became very dusty with a fine layer of flour over everything in sight—including the miller!

One of the chief problems in a grist mill was the danger of explosions. During the grinding, floating dust called *stive* could be ignited by a spark if the stones were placed too close together. There was also danger from the mixture of gases given off during the decomposition of flour, so millers sought to avoid any sparks and therefore used wooden shovels, scoops and similar equipment. Shown are types of tools used in a mill.



Appendix I



Lecture USE
James Madison
1/20/1990

TYPES OF WATERWHEELS

STUDY the diagrams of the different types of waterwheels
Using the models of waterwheels and the tubs of water try
each kind pouring the water manually.

Experiment with volume of water, distance of the fall (BE
CAREFUL AS YOU HAVE TO WIPE UP YOUR MESS!) and the types.

Write down one observation about each type of waterwheel.

Overshot waterwheel: _____

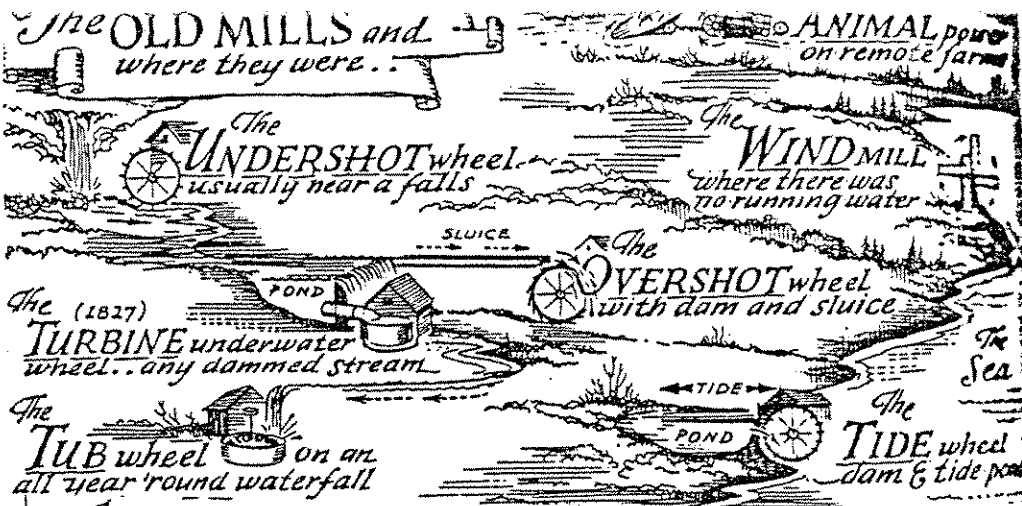
Breastshot waterwheel: _____

Undershot waterwheel: _____

Turbine: _____

CLASS DISCUSSION

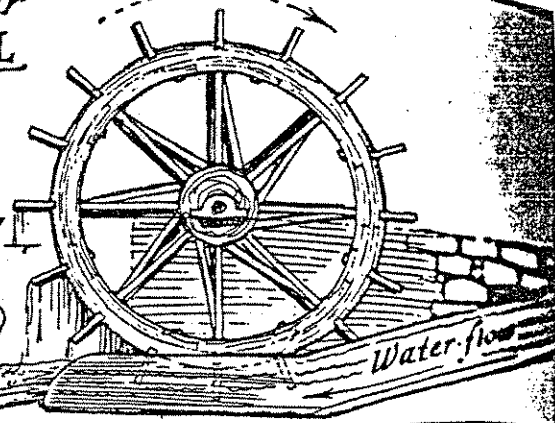
1. Which type of wheel moves the fastest?
2. Which produces the most power?
3. Which can operate with the least amount of water?
4. Would the size of the wheel change anything?
5. How does the volume of water affect the wheel?



Simplified plan of our
EARLY WATER-WHEEL
Types

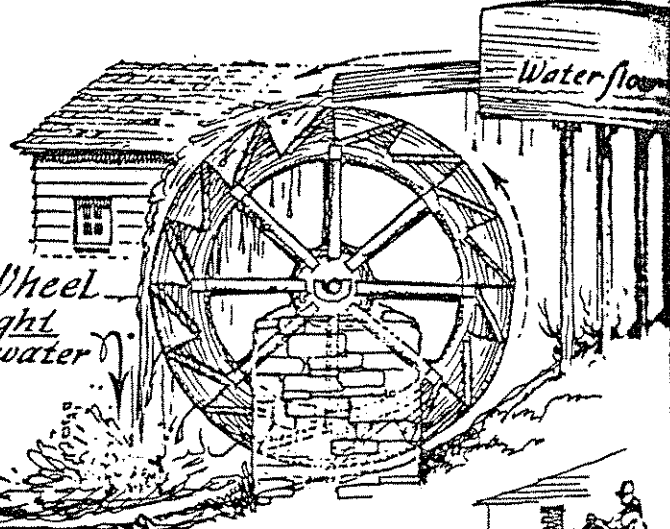
The **UNDERSHOT Wheel**
turned by stream's
Speed

30% EFFICIENT



The **OVERSHOT Wheel**
turned by weight
of water

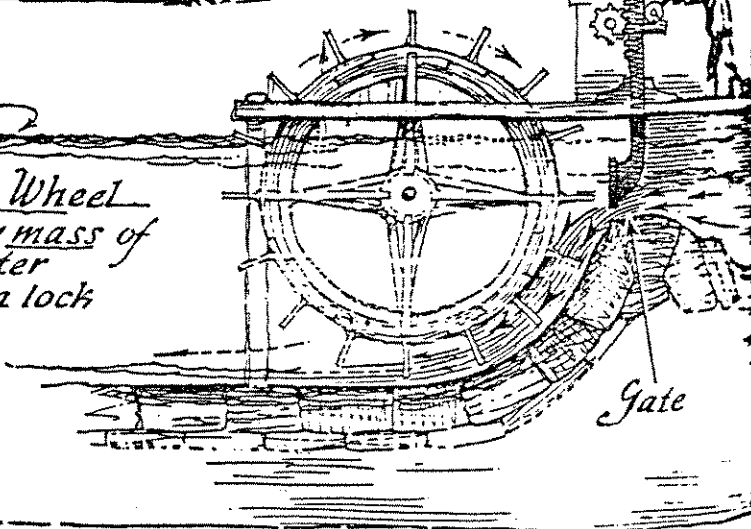
75% EFFICIENT



tide

The **BREAST Wheel**
turned by mass of
water
through a lock

65% EFFICIENT

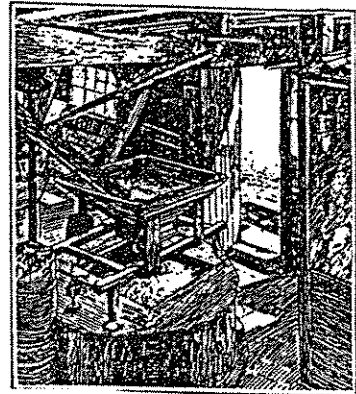


Eric Sloane's America
 Eric Sloane
 Promontory Press Harper & Rowe Publishers
 New York 1956

THE MILLING PROCESS

The milling process contains 7 operations which are:

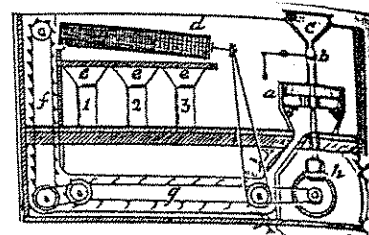
1. Receiving
2. Cleaning
3. Storing
4. Grinding
5. Sifting
6. Packaging
7. Dispatching



The grain is brought to the mill in sacks or a wagon load by the farmer. This is the first step called _____ . The grain is dumped into a hopper and taken by _____ which are inside wooden boxes called _____, to the top floor where it is weighed on a hopper scale. The miller gets paid by the amount of grain he grinds for each customer. From there it goes to the second step which is _____. This machine has two large _____ which separate the debris from the grain.

The grain is then moved by _____ to large wooden receptacles called _____ where it is stored until needed for the fourth and most important step, _____.

If the grain is not used soon it has to be recleaned periodically to stir it so it will not spoil and to keep insects and fungus out of it.



When the person who is in charge of the mill, the _____ is ready to grind the grain, he brings

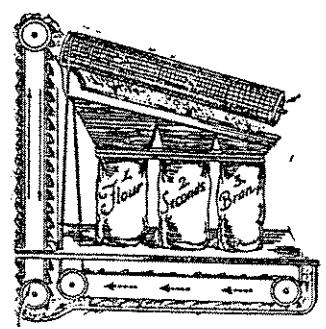
the grain through the conveyors to the _____, which is a wooden box that is large at the top and smaller at the bottom that is located right over the top of the grinding mechanisms. The _____, the round slabs of stone, do the grinding. The _____ one moves while the _____ one is stationary. The grain is fed in through a hole in the middle. The ground substance comes out and is carried by conveyor through an elevator leg to the sifter.



Closely meshed silk is used to separate it into hulls, coarser meal, and flour. This process is step five called _____. The separated substances go through downspouts to bins or bags. This is called _____, step six. It is then ready to be sent home with the owner or sold to the public. This is the last step called _____. The pioneer farmer left a portion of the ground grain as payment to the miller for his work.

While the miller was grinding his grain, the pioneer spent his time in town visiting, buying goods at the general store, having things done at the blacksmith, or taking care of other business.

- | | | | |
|-----------|---------|------------|---------------|
| receiving | screens | grinding | dispatching |
| miller | sifting | top | bottom |
| conveyors | bins | cleaning | elevator legs |
| packaging | hopper | millstones | |

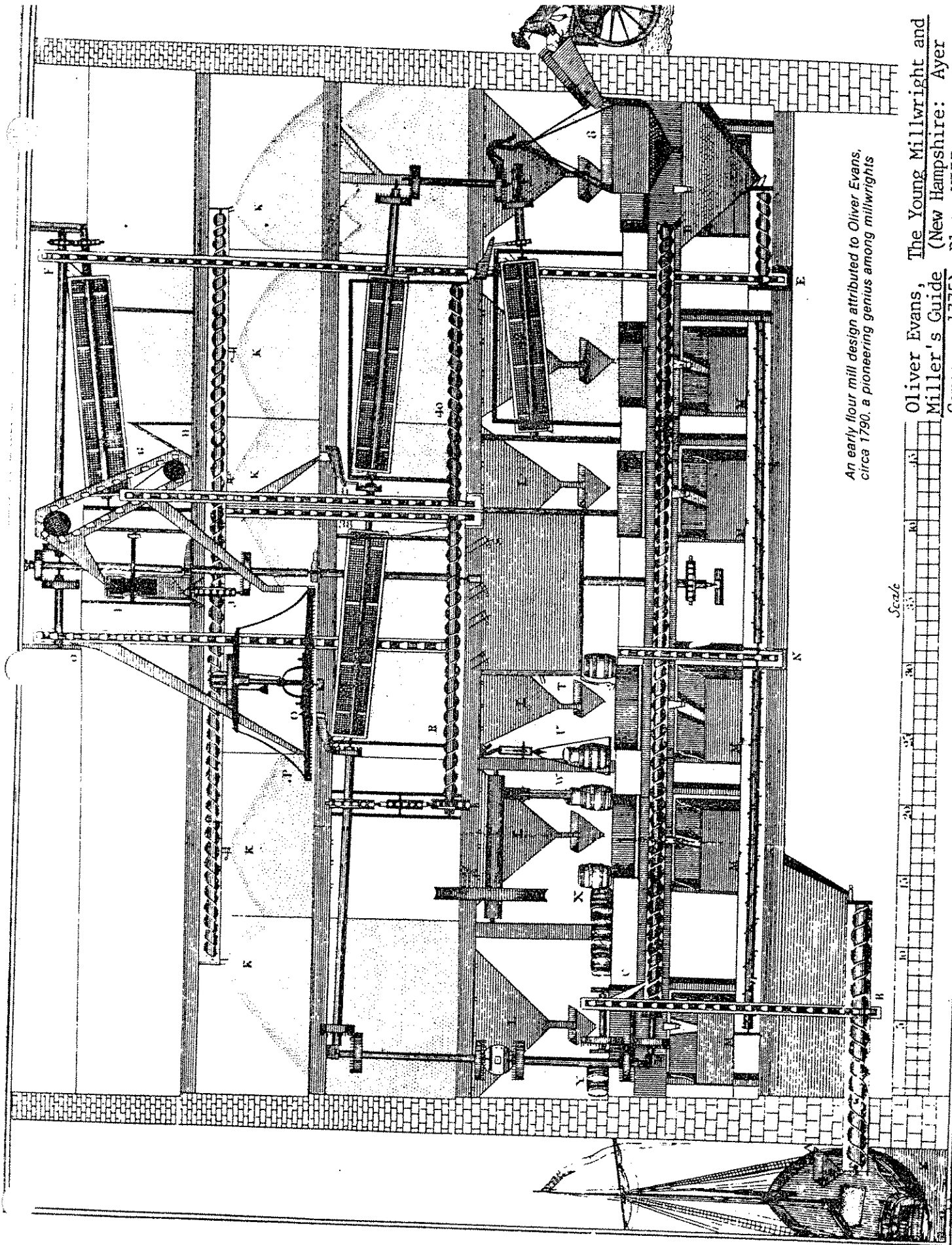


THE MILL MACHINERY

A COOPERATIVE LESSON

STUDY the Spring Mill State Park Leaflet and the Power Transmission from Waterwheel to Mill Machinery DISCUSS the answers and WRITE them on one sheet. PRESENT one demonstration to the class.

1. What is a shaft?
2. What is a gear?
3. Why is it necessary to have a beveled gear?
4. Explain how the water turns the waterwheel.
5. Explain how the waterwheel turns the millstone.
Use these words: vertical, horizontal, shaft, gears.
6. Describe how a belt and pulley transmit power from a turbine to a millstone. Use these words: vertical, shaft, belt, pulley.
7. Choose #4, #5, or #6 to demonstrate to the class.
Use straws, tinkertoys, or whatever will work for you.

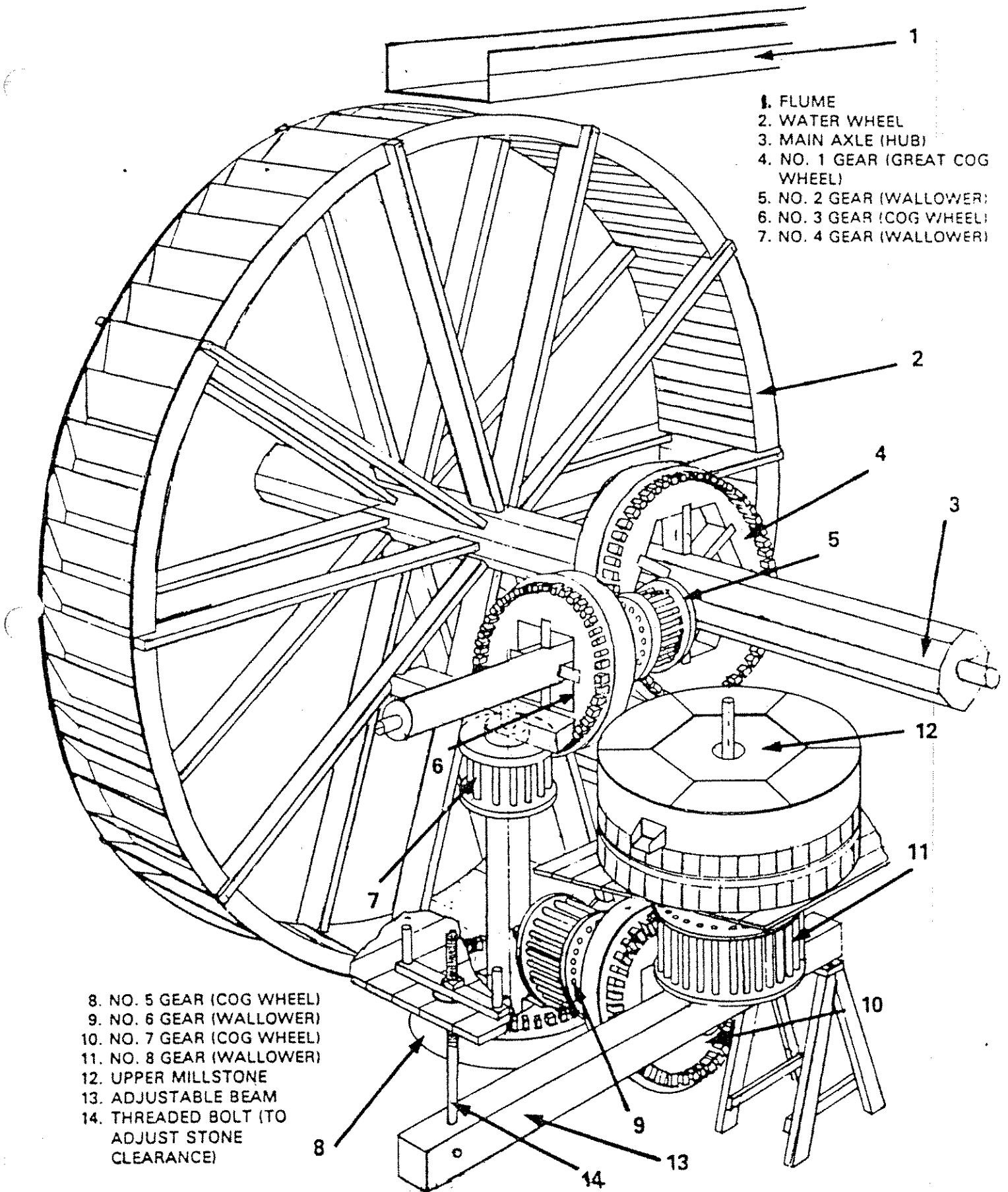


An early flour mill design attributed to Oliver Evans, circa 1790, a pioneering genius among millwrights

Scale



Oliver Evans, The Young Millwright and Miller's Guide (New Hampshire: Ayer Company, 1775) Plate VIII

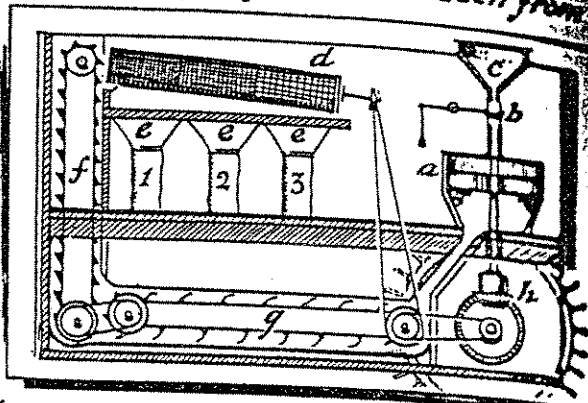


- 1. FLUME
- 2. WATER WHEEL
- 3. MAIN AXLE (HUB)
- 4. NO. 1 GEAR (GREAT COG WHEEL)
- 5. NO. 2 GEAR (WALLOWER)
- 6. NO. 3 GEAR (COG WHEEL)
- 7. NO. 4 GEAR (WALLOWER)

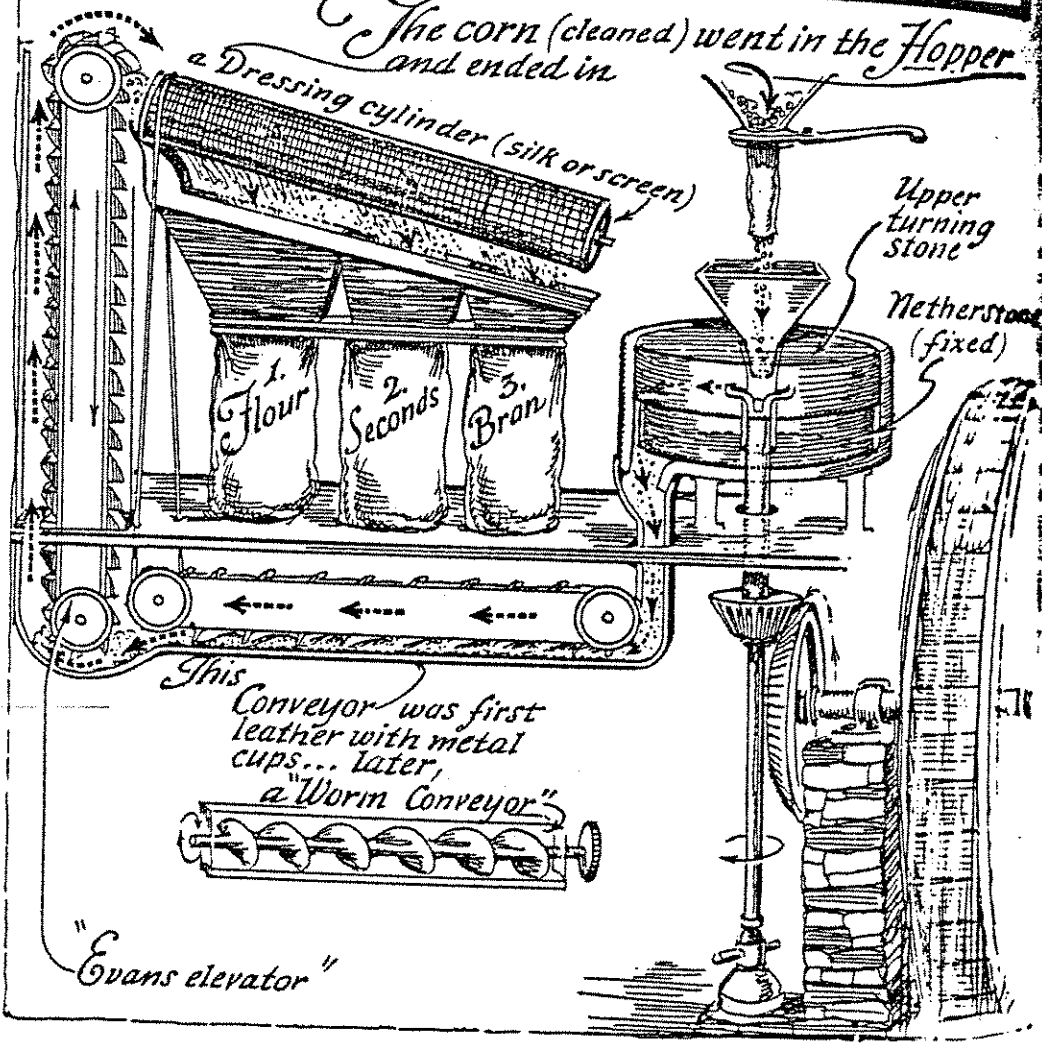
- 8. NO. 5 GEAR (COG WHEEL)
- 9. NO. 6 GEAR (WALLOWER)
- 10. NO. 7 GEAR (COG WHEEL)
- 11. NO. 8 GEAR (WALLOWER)
- 12. UPPER MILLSTONE
- 13. ADJUSTABLE BEAM
- 14. THREADED BOLT (TO ADJUST STONE CLEARANCE)

What went on inside a Grist Mill of 1850, as seen from
a Millwright's sketch

- a. MILLSTONES (2)
- b. VALVE CONTROL
- c. MAIN HOPPER
- d. DRESSING CYLINDER
- e. HOPPERS for GRADING
- f. ELEVATOR
- g. CARRIER & COOLER
- h. SPUR-WHEEL DRIVE

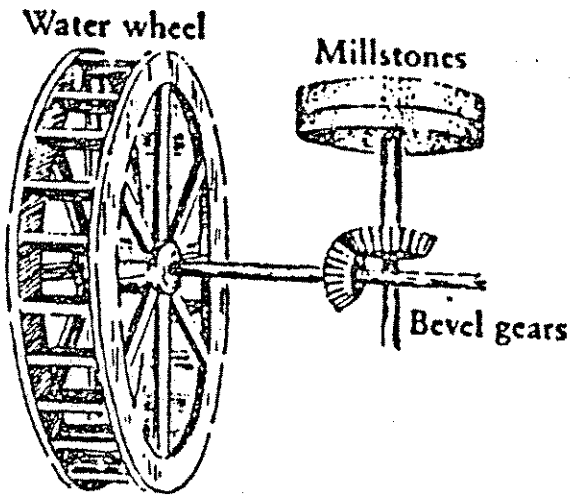
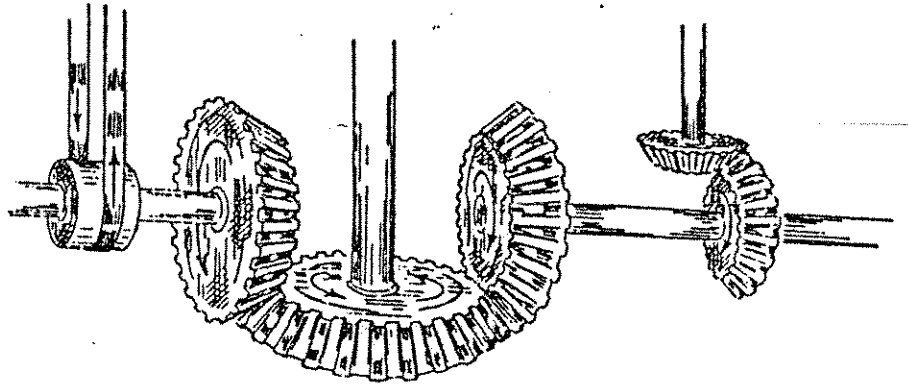


The corn (cleaned) went in the Hopper
and ended in

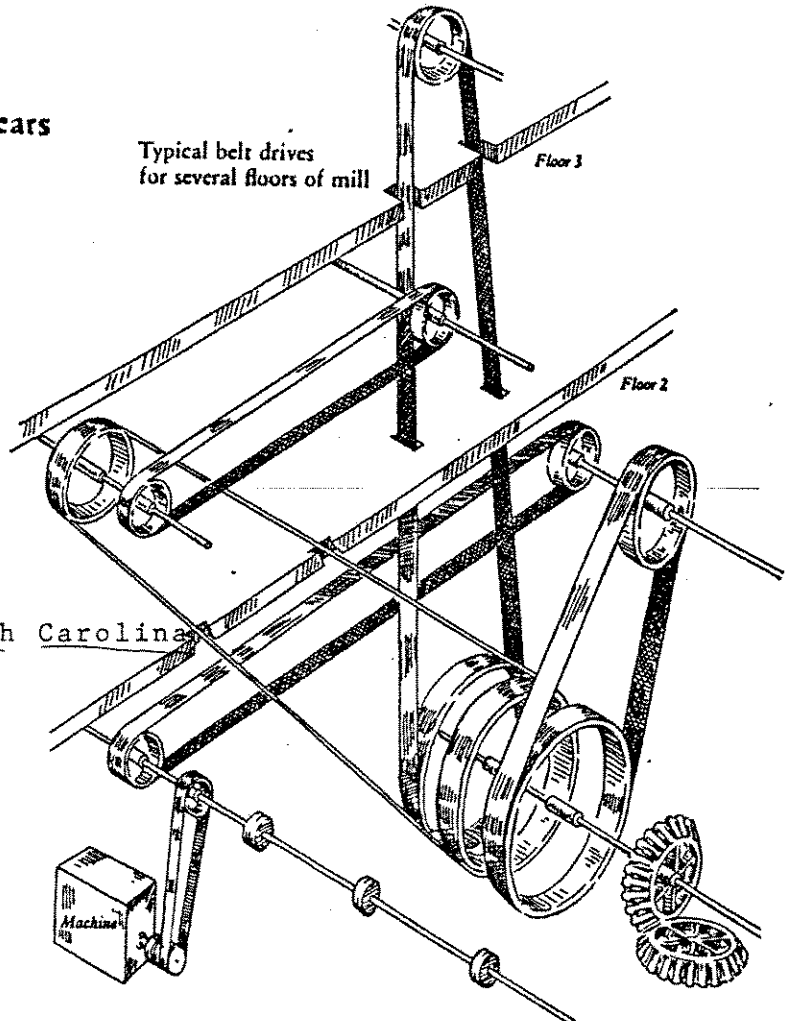


This
Conveyor was first
leather with metal
cups... later,
a "Worm Conveyor"

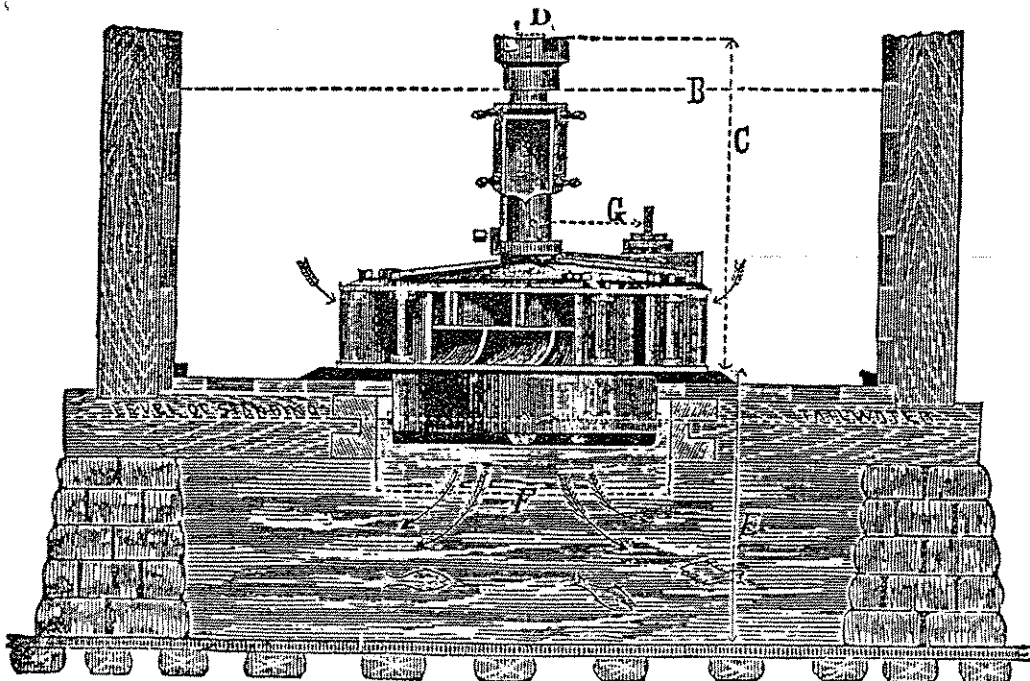
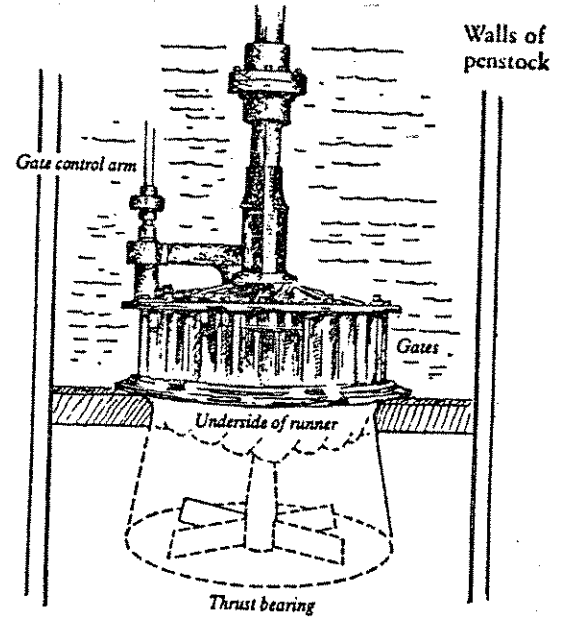
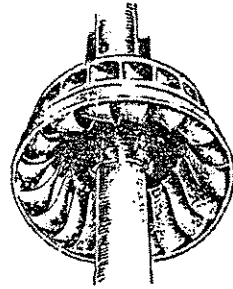
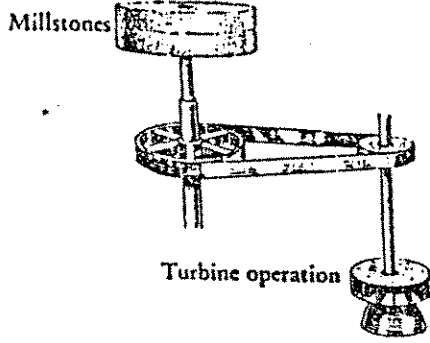
"Evans elevator"



Typical belt drives for several floors of mill

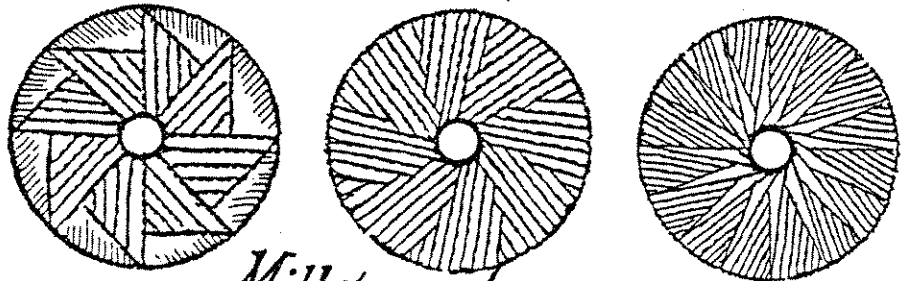
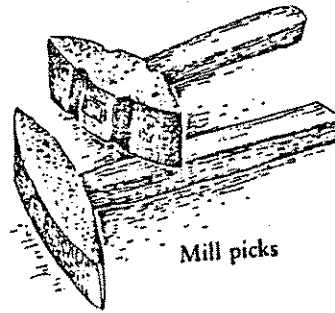
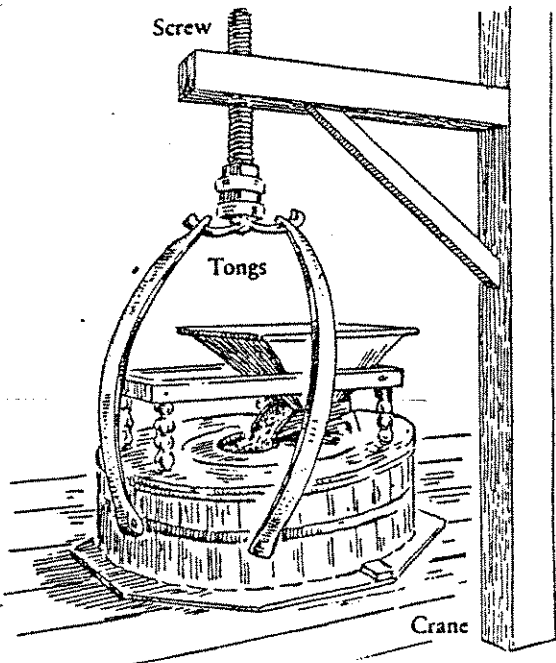
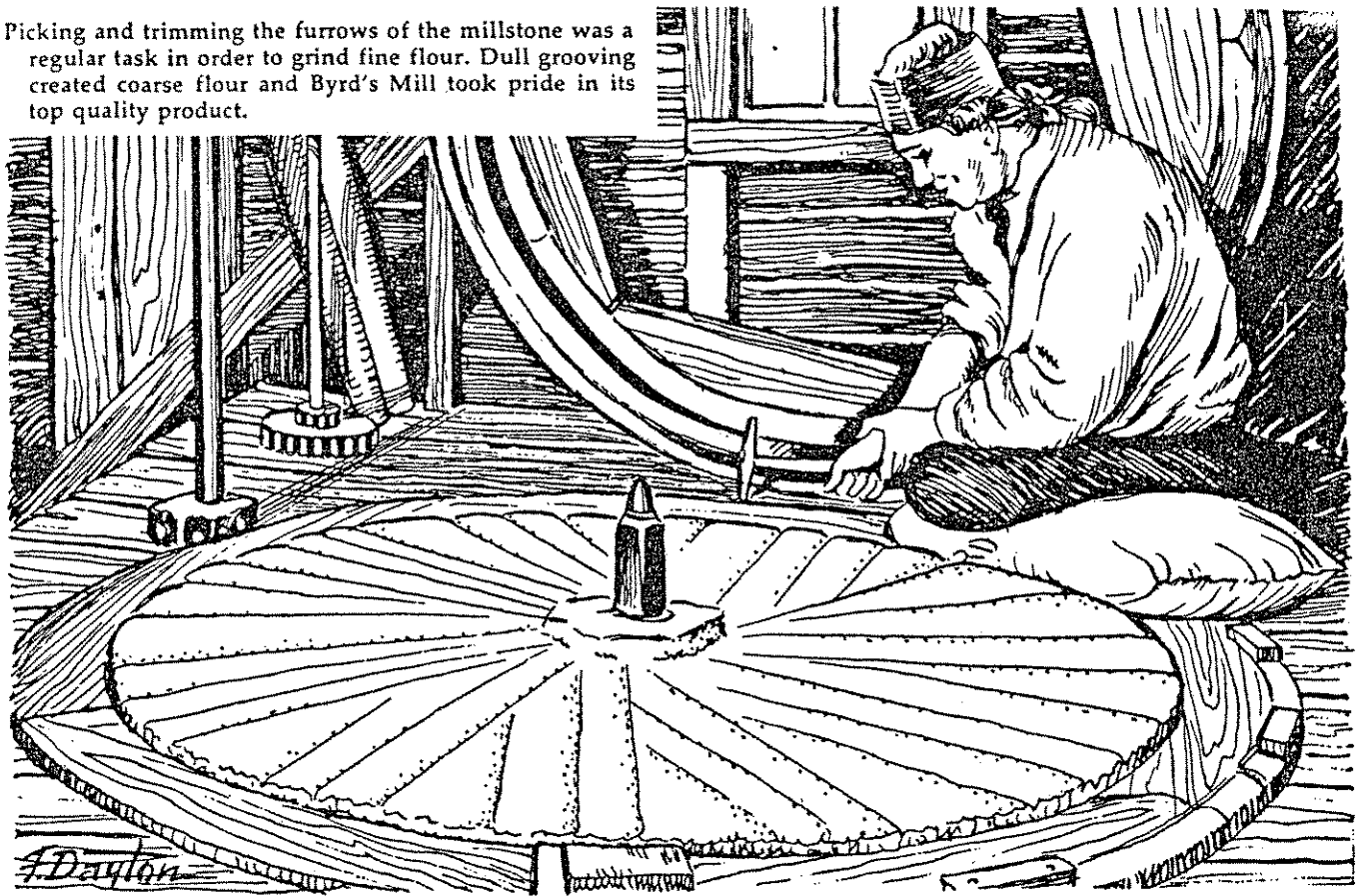


Exploring the Old Mills of North Carolina
 Kate Forbes
 North Carolina
 The Provincial Press 1985

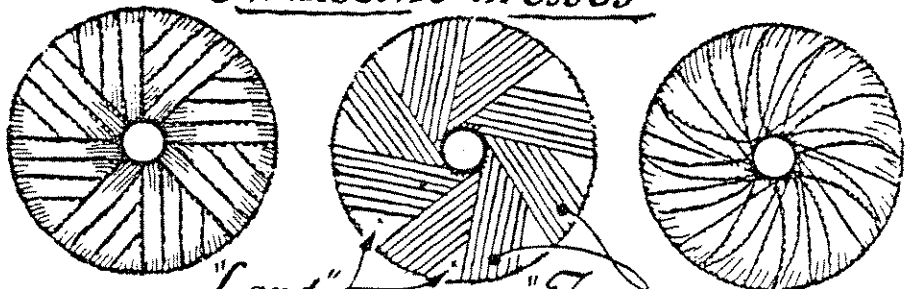


Kate Forbes, Exploring the Old Mills of North Carolina (North Carolina: The Provincial Press, 1985)

Picking and trimming the furrows of the millstone was a regular task in order to grind fine flour. Dull grooving created coarse flour and Byrd's Mill took pride in its top quality product.

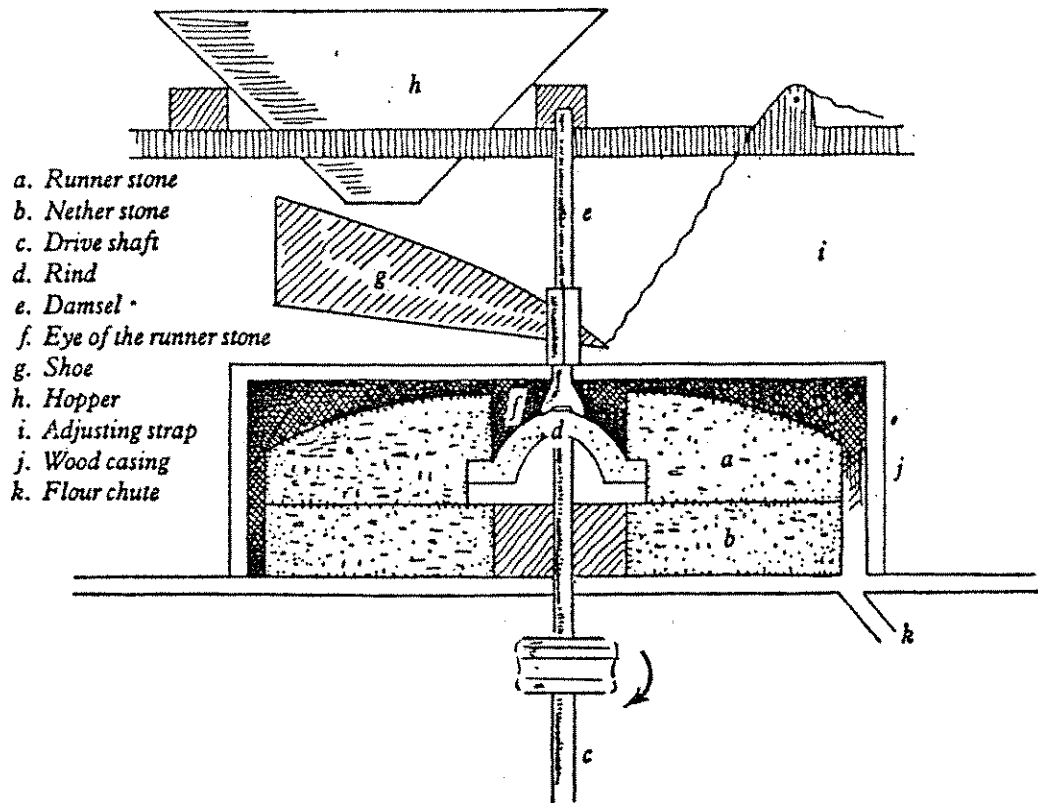


Millstone dresses



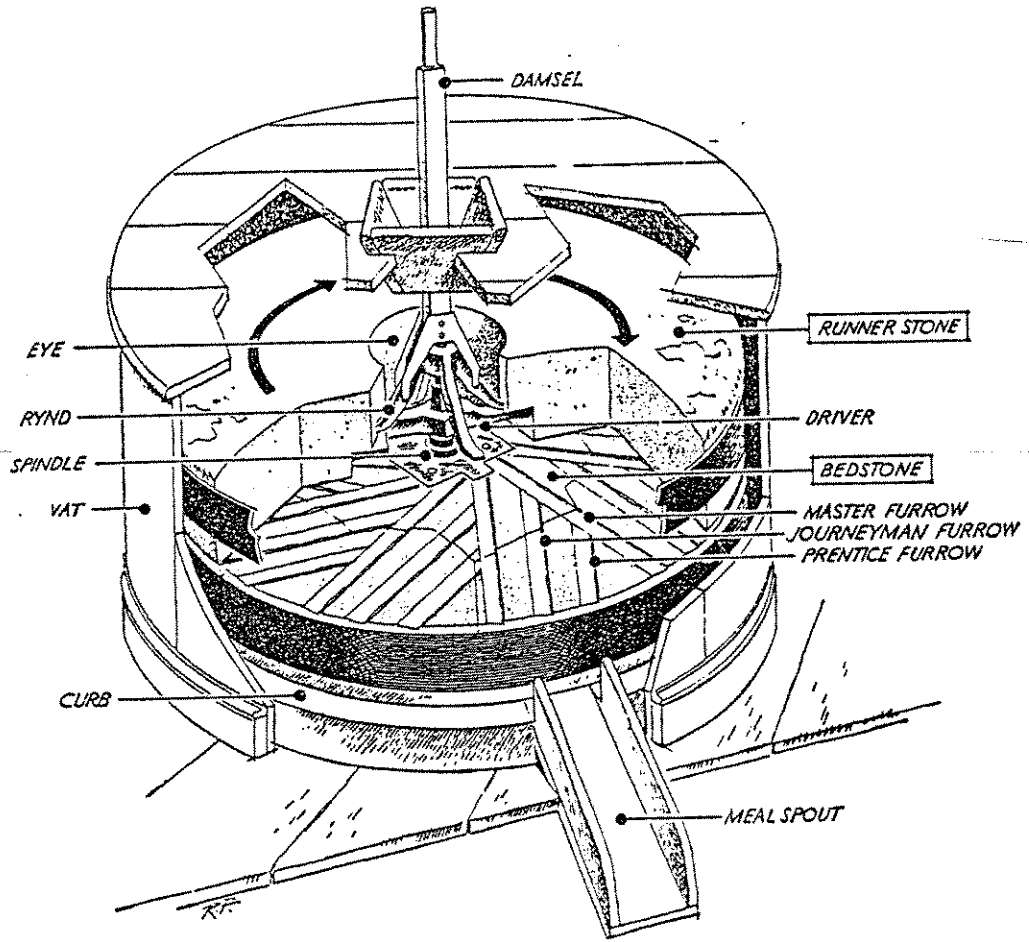
"Land" "Furrows"

Grist Mills
Applied Arts Publishers
Lebanon, Pennsylvania



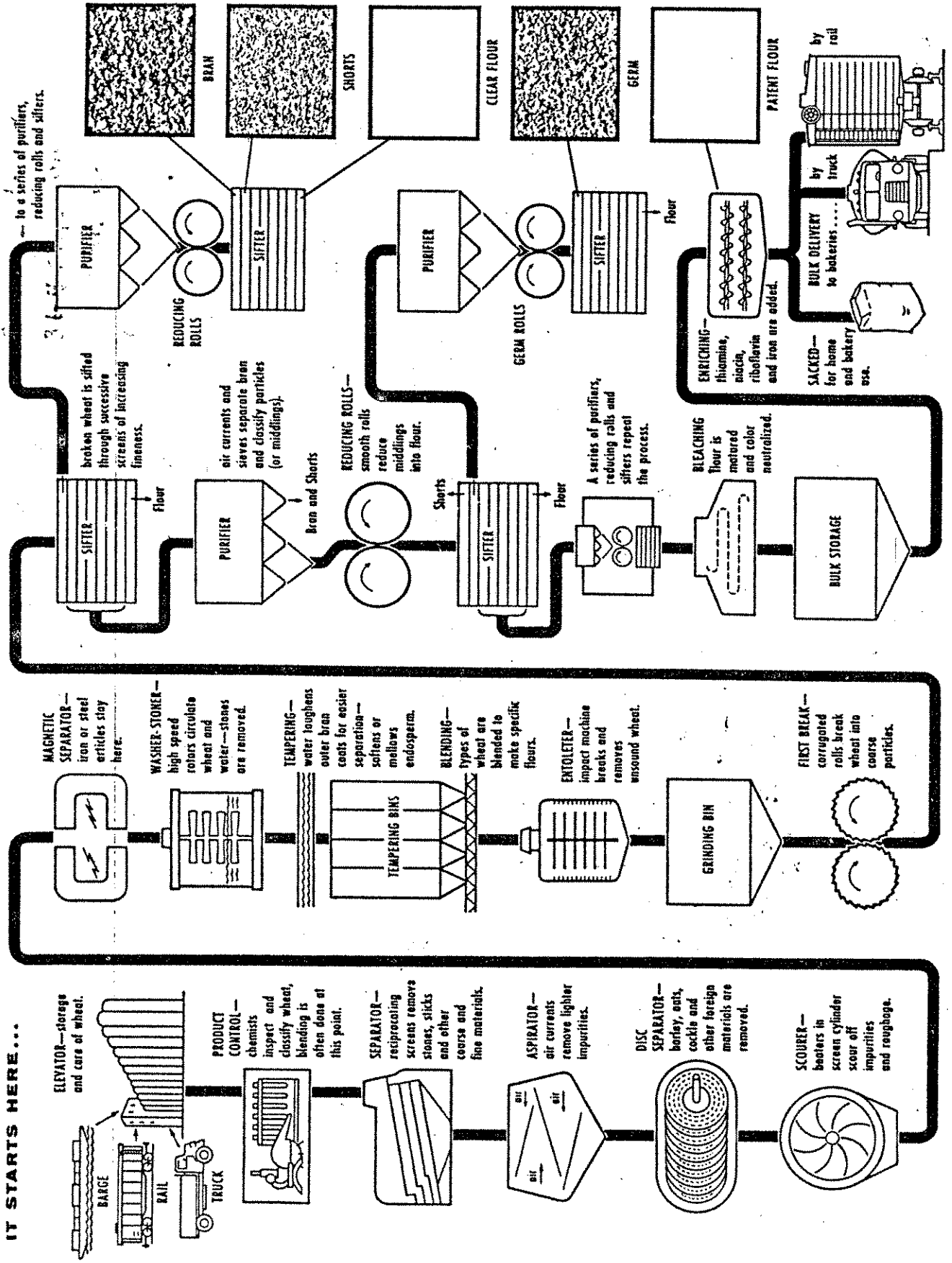
- a. Runner stone
- b. Nether stone
- c. Drive shaft
- d. Rind
- e. Damsel
- f. Eye of the runner stone
- g. Shoe
- h. Hopper
- i. Adjusting strap
- j. Wood casing
- k. Flour chute

Shaft "c" turns top millstone



HOW FLOUR IS MILLED

(A SIMPLIFIED DIAGRAM)



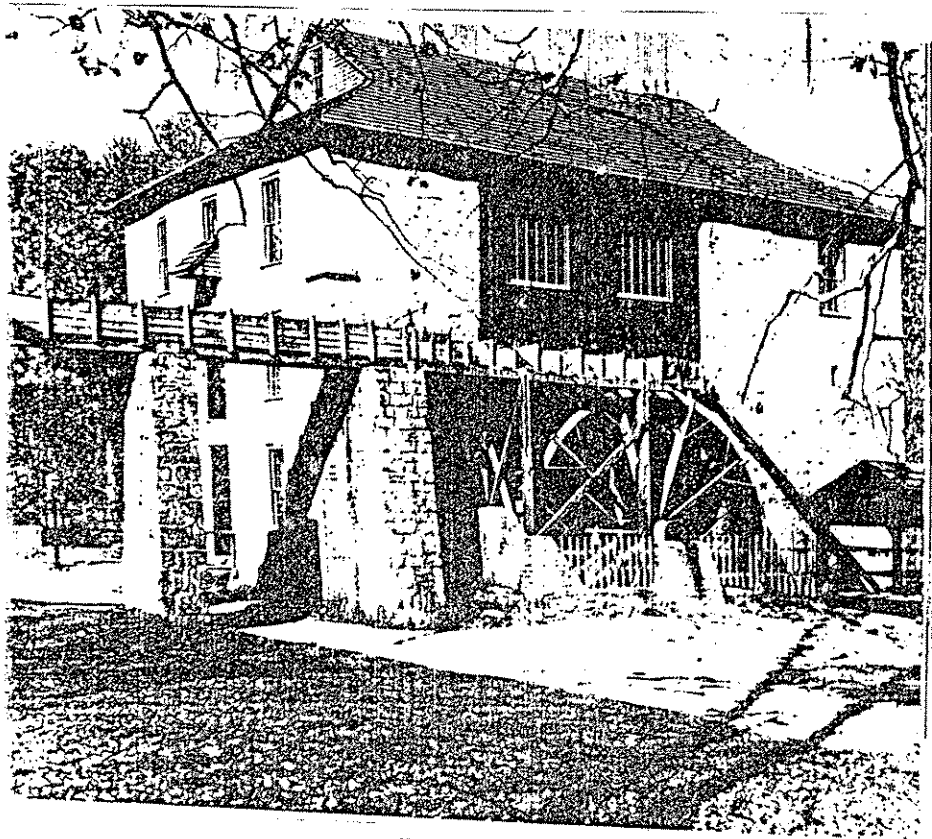
NOTE: This chart is greatly simplified. The sequence, number, and complexity of different operations vary in different mills.

SPRING MILL

READ and STUDY the information on Spring Mill. ANSWER the questions.

1. In which county is Spring Mill State Park?
(Lawrence County)
2. What type of waterwheel operates the mill?
(Overshot)
3. What is the water source for the mill?
(Spring Mill Creek)
4. From where does the mill get its name?
(From the large spring in Hamer Cave from where the water comes)
5. How does the water get from the creek to the mill?
(By a long wooden flume)
6. From what are the piers made of that support the flume?
(Limestone)
7. What year did the mill begin operation?
(1817)
8. From where did the limestone come from for the piers?
(Lawrence County)
9. How did Samuel Jackson, Jr. become familiar with Indiana Territory?
(He was a guide for William Henry Harrison after the War of 1812)
10. How did he get the land originally?
(As a squatter)
11. Why were Cuthbert and Thomas Bullitt called "The Merchants of Louisville"?
(They owned most of Louisville and ruled their empire from mansions overlooking the Ohio River.)
12. What did they do for Spring Mill?
(Built it into a thriving town, enlarged the stone quarry, built the mill three stories high, had skilled craftsmen finish the inside beautifully, and built two mansions on the property.)
13. Under whose ownership was it named Spring Mill and when?
(Hugh Hamer in 1831)

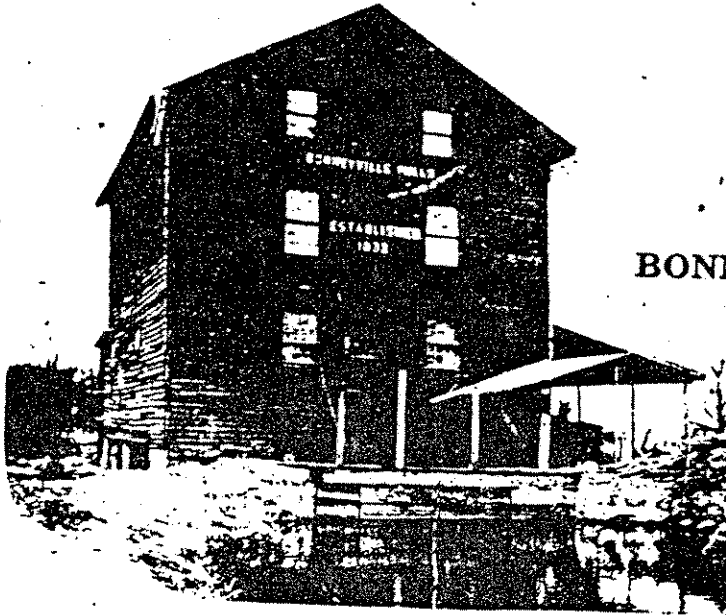
14. What indications were there of its prosperity in the 1830's and 40's?
(Long wait for mill, regular stop for stage, corn liquor was produced.)
15. What caused it to depreciate in the 1860's?
(Railroads went around it, Civil War cut off Hamer's southern markets, and steam driven gristmills came)
16. Who preserved the natural beauty of the park after the mill fell into ruin?
(George Donaldson, an eccentric Scotsman)
17. What was discovered on the property after by an Indiana University professor after it ended up as their property?
(Dr. Carl Eigenmann discovered the rare amblyopsis, blind fish)
18. Who was the Father of the State Park System?
(Colonel Richard Lieber)
19. What kinds of reconstruction took place to get it to its present picturesque state?
(Rebuilding the waterwheel, rebuilding the flume, fixing and restoring the buildings.)
20. What other Hoosier is honored in the park and how?
(Virgil Grissom, Astronaut by a memorial and a building)



Hamer Mill, Spring Mill State Park

Outdoor Indiana, May, 1979

BONNEYVILLE MILL PARK



THE OLD
BONNEYVILLE MILL

What a quaint little structure is Bonneyville Mill,
Stuck under the brow of a neighboring hill;
Where the eyes of each traveler are thrilled by the sight
Of the glories of day and the beauties of night.
Here the yodeling birds which inhabit the trees
Co-mingle their songs with the sigh of the breeze;
Till the shadows of twilight all valleys doth fill,
'Round this old-fashioned building called Bonneyville Mill.

Near this small, simple structure named Bonneyville Mill,
A river is winding, so lucid and still;
And fishermen linger for hours by its brink,
Where the drowsy-eyed cattle are pausing to drink.
There's a fragrance abroad in the sweet country air,
An abundance of bud and of bloom everywhere;
And we hear the sad plaint of a lone whippoorwill
From a wood that's adjacent to Bonneyville Mill.

Oh, this dear little structure called Bonneyville Mill,
Holds a moral for man—that he ought to fulfill
The duties of life with a heart which is true,
Completing each task he's given to do.
In this old-fashioned building great lessons exist,
Which oft are unheeded and frequently missed;
So I find me some paper and take up my quill,
To write a short rhythm on Bonneyville Mill.

Ralph Scoles Thomas

BONNEYVILLE MILL COUNTY PARK
THE STORY OF EDWARD BONNEY
THE HISTORY OF BONNEYVILLE MILL

Bonneyville Mill is the oldest continuously operating grist mill in the state of Indiana. It has produced quality flour for over 150 years.

The mill site on the Little Elkhart River was chosen as the center for a rapidly growing town. This vision was due to the close proximity of the Toledo/Chicago Trail and the navigable St. Joseph River, providing access to Lake Michigan. The dream ended when the railroads bypassed the Bonneyville site and the proposed canal system was never developed.

Edward Bonney was the man with this dream. He was born August 26, 1807, in Essex County, New York. He married Maria L. Van Frank in Homer, New York, on January 17, 1832. He moved to Elkhart County in 1835. The land was purchased in 1837 and soon after a sawmill and gristmill were built on the property.

In 1841 he bought a tavern in Goshen, then sold the mill in 1842 or 1843.

The story is told that he was suspected and/or accused of being involved in a counterfeiting scandal and fled the area as an outlaw. This accusation has never been proven. When his house at Bonneyville was torn down, some counterfeit coins were found dated 1825. The speculation on this makes an interesting story.

Edward Bonney, along with his pregnant wife and three daughters moved to Navvoo County in Illinois in May, 1844. In April, 1845, he moved again to Montrose, Iowa, in Lee County where he owned a livery stable and was a bounty hunter. His next moves were to Rock Island, Illinois, in 1846, then to Prospect Park, DuPage County, Illinois. Here he campaigned for Justice of the Peace in 1847 but was defeated. His family was completed here which included the following: Bernice, born October 31, 1832 and deceased in 1839; Mary, born April 1, 1839; Martha, born February 10, 1842; Ellen, born October 13, 1844; and William, born January 4, 1848. His next move was to Aurora, Illinois.

He wrote his book, Banditti of the Prairies or the Murderers Doom, in 1850. In 1863 he lived in Chicago and was listed as a soldier. He served in the Civil War in the Union Army. Some think this was to pay his debt as a counterfeitor. He died February 4, 1864. His burial place is unknown. Three of his children are buried in Bonneyville Cemetary.

Whatever the scandal of Bonney, the mill remains a landmark and is listed in the National Register of Historical Places compiled by the Society for the Preservation of Old Mills. It is still operating today as a turbine powered mill with the interior essentially unmodified from the original construction. There are four floors with the turbine underneath the basement

floor. On the first floor are the millstones, the cornmeal sifter, storage bins, the mill office and a wood burning stove for heat. The second floor contains the hopper scale, the buckwheat sifter, and other machinery. The third floor houses the storage bins, cleaner, and line shafts. Throughout the mill are the elevator legs, shafts, wheels, pulleys, and belts. The entire mill is constructed with thick lumber held together with wooden pegs and notches. Antique parts are on display throughout the mill.

From 1843 to 1889 the mill site had many owners. A four page printout is available at the Bonneyville Mill Park by contacting John Jenney, present operator of the mill.

Bonney had installed a horizontal waterwheel, the turbine, which made it a progressive mill of the time. It produced larger quantities of horsepower than the traditional waterwheel. In the 1880's roller milling was being introduced in this country as a substitute for millstones. Bonneyville preferred to remain a mill of the Civil War Era, serving the local people.

The beginning of the Blood Family ties was in 1889. In 1918 Robert and Katherine Blood acquired the mill.

The Depression hit and Bonneyville survived by forming Bonneyville Power and Electric Company in 1932. It supplied hydro-electric power to about 45 customers. After that it became involved in custom grinding livestock feed, broiler feed, and whatever the local people needed. It also ground its "Famous Buckwheat Flour".

In 1943 Robert Blood died and in 1949 his children, Harold M. (Mike) Blood and Nellie Mauck (Blood) acquired the mill. During the 1950's regulatory legislation and advancing technology overwhelmed the small milling business and the mill owners were forced to sell out to Frank Mauck in 1962. He in turn sold it on November 1, 1968, to the Elkhart County Chapter of Michiana Watershed, Inc. It was then presented to the Elkhart County Park and Recreation Board in 1969.

The mill is located in Bonneyville Mill County Park in Elkhart County, 2 1/2 miles southeast of Bristol, Indiana. It is on County Road 131 south of State Road 120. The 155 acre park is mostly in its natural state with rolling hills, a river, and marsh lands. Many varieties of vegetation and species of wildlife can be present there. Summer picnicking, nature trails, and fishing are popular activities. Wintertime affords cross country skiing and sledding. The mill is open every day of the year except Christmas and New Year's Day.

The mill was restored in the early 1970's and returned to operating condition. It was re-opened in 1974 and continues to operate today. It grinds corn, wheat, rye and buckwheat the old fashioned way from May through October. One feels the step back in time as the stones rumble and water rushes under the mill. The wooden pegs and solid construction give antiquity to the massive structure. With the purchase of meal the visitor can return home and make some recipes reminiscent of the past, but still tasty in the present.

Written by Joanne F. Cox, 1991
Compiled from research by John Jenney

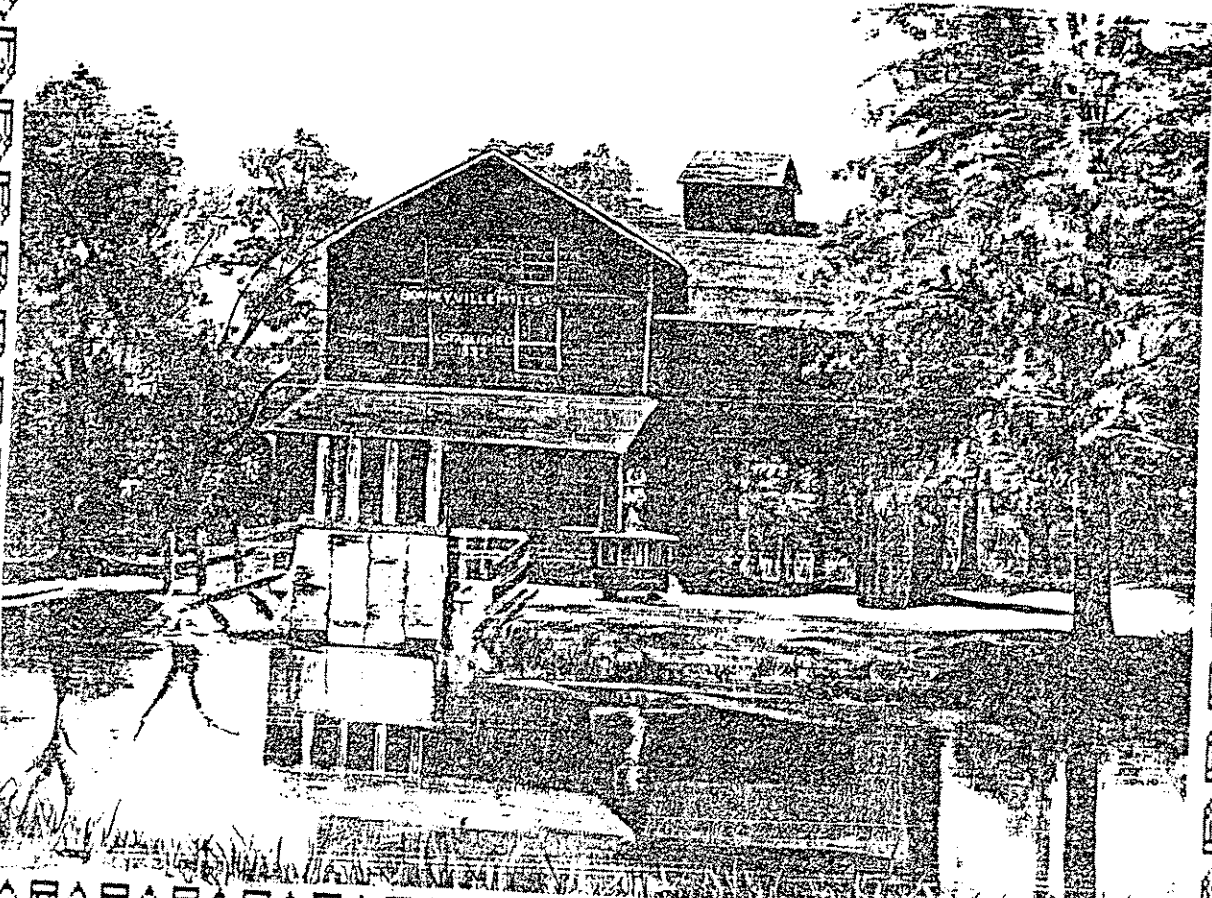
BONNEYVILLE MILL

READ and STUDY the information on Bonneyville Mill
ANSWER the questions

1. What is Bonneyville Mill's claim to fame?
(Oldest mill in continuous operation in Indiana)
2. In what decade did it begin operation?
(1830's)
3. What kind of wheel does it have?
(turbine)
4. From where does it get its water?
(Little Elkhart River)
5. For whom is the mill named?
(Edward Bonney)
6. What two reasons did he have for selecting this location?
(Near the Toledo/Chicago Trail and the St. Joseph River)
7. What two reasons caused his dream to end?
(The canal system never developed and the railroad bypassed this site)
8. What story has been told about why he fled the area?
(Counterfeiting scandal)
9. How did the mill help out during the Depression?
(Supplied hydro-electric power as the Bonneyville Power and Electric Company)
10. What famous product did they grind at the mill after the Depression?
("Famous Buckwheat Flour")
11. What forced the mill owners to sell?
(Laws regulating the mill and advanced technology)
12. In what year did the Elkhart County Park Board get it?
(1969)
13. Who is the man who operates the mill now?
(John Jenney)
14. Near what town is the mill?
(Bristol)
15. What kinds of grain does it grind?

(Corn, wheat, rye, and buckwheat)

16. How is the mill building held together?
(Wooden pegs)
17. How many stories are in the mill building?
(4)
18. What is on each floor?
(1-turbine wheel, 2-millstones 3-cleaner, scales
4-sifter, storage bins)
19. What kinds of things are on display outside and inside
the mill?
(antique parts like turbines, gears, wheels, millstones)
20. What kind of heat is used in the mill?
(Wood stove)



WILLIAM TUFFS
PORTRAIT OF A PATRIOT

William Tuffs, a participant in the Boston Tea Party, a Revolutionary War soldier, and a soldier of the War of 1812 is buried in Bonneyville Cemetery located near Bonneyville Mill County Park in Bristol, Indiana. On the site are two inscribed stones.

On September 27, 1922, a ceremony was held in his honor. About five hundred people were present. A huge granite boulder, 6'x5'x2' and weighing 9,000 pounds, was unveiled. On a plaque was the inscription

William Tuffs
Born
September 20, 1740
Died
September 19, 1848
Aged 108 years

His life was marked by fact of Revolutionary character--by being present at the Battles of White Plains, Germantown, Monmouth, Bunker Hill, and Lundy's Lane, and by being present at the throwing overboard the tea at Boston.

This was paid for and erected by Indiana tribesmen of the Modoc Tribe of the Improved Order of Redmen.

Another smaller stone was given by the Indiana Sons of the American Revolution. Its inscription reads

Beneath this stone reposes the dust of a patriot, William Tuffs of Massachusetts, participant in the Boston Tea Party, a soldier of the Revolution, and a soldier of the War of 1812. This tablet was erected by the Indiana Sons of the American Revolution.

William was born in Mystic, Massachusetts, to an innkeeper. In those days an inn was more than a place to sleep and eat. People from all walks of life spent time discussing and arguing all kinds of topics, especially the problems of the time. William grew up in this environment in the Boston area listening and learning.

At the age of 33 he joined the "Patriots", who were meeting in the Old South Meeting House in Boston. Their participants were from all types of backgrounds, but their common interest was their dislike of the English imposed taxes. "Taxation without Representation" was their cry. They threw the tea overboard the English ship into the Boston harbor to protest the tea tax. William Tuffs was one of the participants in this Boston Tea Party.

In April, 1775, he was drafted into Captain William Wentworth's Company, Colonel Gill's regiment and served at Castle William for 90 days. After 10 months he re-enlisted and served nine months at Lake George in Captain Cornelius Sanford's company.

His next stint in the army was as a minuteman under Captain Samuel Tucker and Lt. Peter Smith. He fought in several battles and was taken as a British prisoner in the Battle of Ticonderoga. Records are not available as to whether he was freed or escaped, however he received some facial wounds during this part of the war and remained scarred.

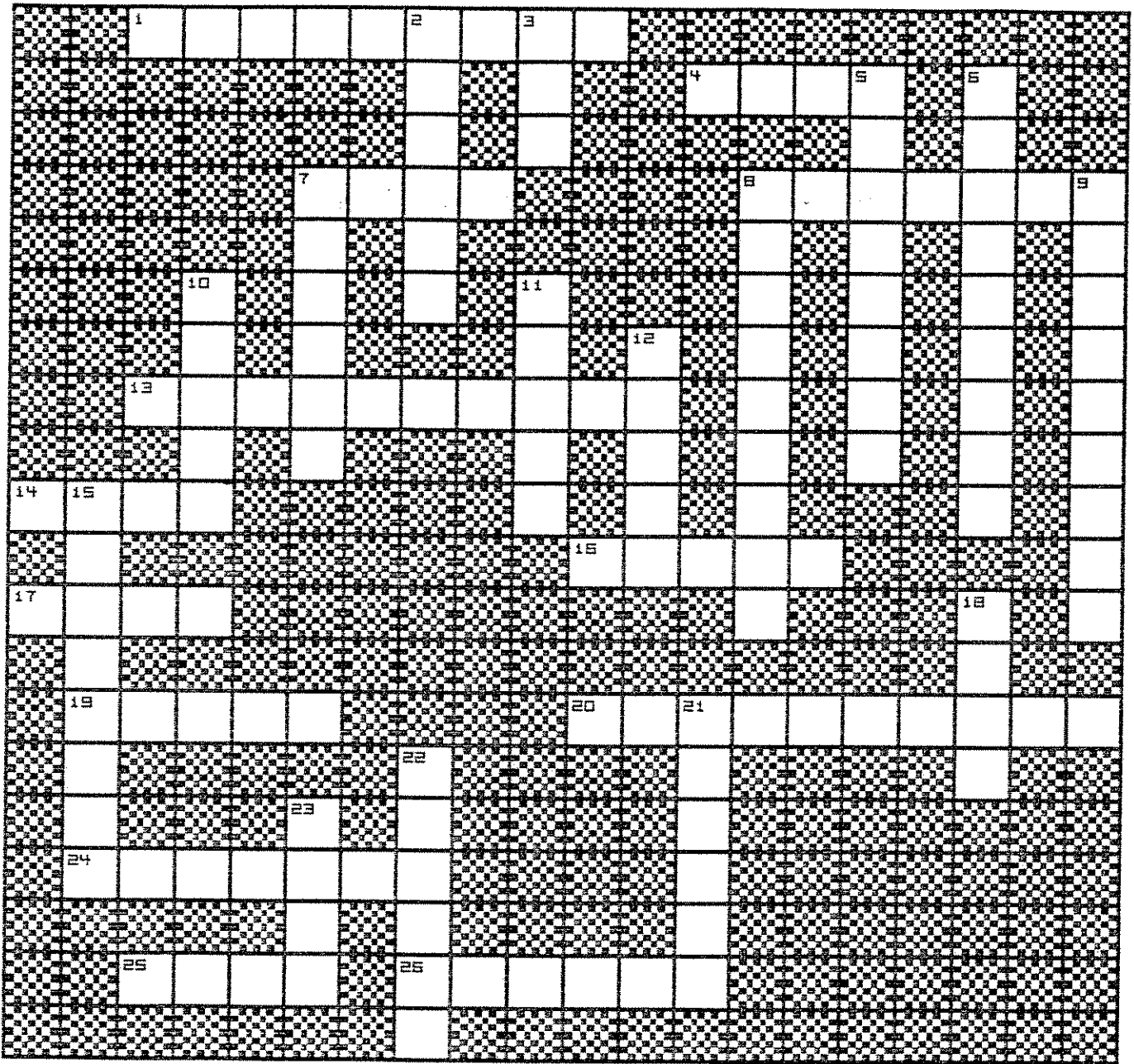
He was married at one time and had a son, John Tuffs, and a daughter, Mrs. Jonathon C. Braman, who lived in the Middlebury area. Mr. Tuffs moved several times and ended up in Elkhart County, Indiana, where he lived with his nephew, James Goff Sedler. He died at the age of 108.

In 1920 the Modoc Tribe of the Improved Order of Redmen began to trace William Tuffs. They found enough information to locate his grave. A descendant, George E. Reed of Fremont, Indiana, had taken his gravestone to preserve it.

There were many stories told by him to his relatives and friends about the revolution. He served almost the entire period. He was truly a patriot and was very proud to have served his country.

Summarized from an article written by Carl R. Mauck

MILLS



ACROSS CLUES

1. The inner part of a grain kernel that is milled for white flour.
4. The inner part of a grain kernel that sprouts a new plant.
7. A building with machinery that grinds grain.
8. A dam made across a stream to build up enough water to turn a waterwheel.
13. A wheel rotated by the flow of water and used to work mill machinery.
14. A cereal grain that was the most important food source for the pioneers.
16. The process that happens to the grain as it is made into flour.
17. A device for connecting the moving parts of a machine by toothed wheels.
19. A long rod transmitting motion to a part of a machine.
20. Fried bread made from cornmeal.
24. An engine activated by a water current subjected to pressure.
25. Enclosed wooden boxes encasing the conveyors that carry the grain anywhere inside the mill.
26. A machine that uses a series of screens to separate particles from the grain.

DOWN CLUES

2. A wheel on a fixed shaft used to transmit power.
3. A cereal grain made into flour which makes very dark bread.
5. The strong current of water which drives the mill wheel.
6. A type of waterwheel driven by water passing under it.
7. Someone who runs a mill.
8. One of two circular slabs of stone used for grinding grain.
9. The ponds formed by a milldam.
10. The seed of cereal plants.
11. The most popular cereal grain ground into flour.
12. Finely ground grain meal used for making foodstuff.
15. A type of waterwheel driven by water flowing over the top of it.
18. The outer covering of a grain kernel.
21. A wooden container which is larger at the top and narrow at the bottom.
22. A type of waterwheel receiving water on its backside and driven by gravity and the water.
23. Wooden receptacles for storing grain.

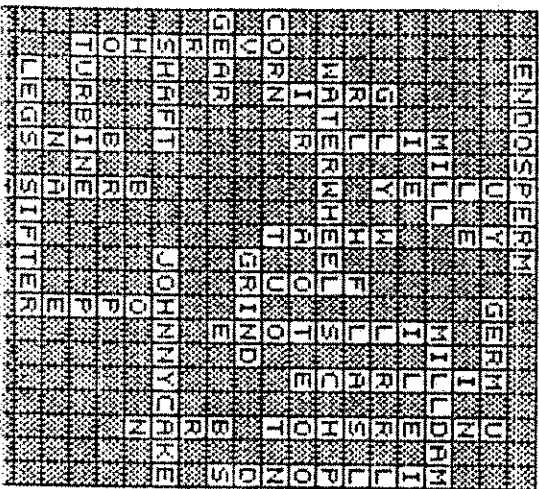
WORD LIST: MILLS

BINS
BRAN
BREAST
CORN
ENDOSPERM
FLOUR
GERM
GEAR
GRIND
GRAIN

HOPPER
JOHNNYCAKE
LEGS
MILL
MILLDAM
MILLRACE
MILLER
MILLSTONE
MILLPONDS

OVERSHOT
PULLEY
RYE
SHAFT
SIFTER
TURBINE
UNDERSHOT
WATERWHEEL
WHEAT

ANSWERS: MILLS



Gristmills

F A C C O R N M E A L F M B W R K B N U
J C F A E R N G I L I D V O I W X E B B A S
H O P P E R L I Y S Q P V H V U C H G
U R U B N A L K F F L U M E R V C K M
O N L V D I W S T M C E L A R D K P V
F F L G O I N R N K O L E M T N S W U B
M C E S S T I B W E D I E V P O H Y G
Y A Y P T G R V G L M E X F B E O H
R Q J A P E R H A E L Q Y C G C I A M T
I D U Y E R J T A S L O J W P E N T I E
F B Y E M O R T A R P E N S T L E
K D B B O R H O B S T U R B I N E B L T
Z U R L U N D E R S H O R T N Y E E P N
L K E M E N M Y P G E R I M S L Y L O J
P G A I O Y I I F M L I T H L M N W
A W S L G C L Z L J L F L L O O A T D X
U S T L M A L X O L T Q L L C O O X F I B
O R S R R K O L U R A N W R G R R Q F X
N T H A Y E A B R A N W R G R R Q F X
D O O C R E M P J A S R K Y H D W U Y
W A T E R W H E E L G A G M V C B A K

Can you find these words?

MORTAR AND PESTLE
JOHNNYCAKE
WATERWHEEL
QUERNMILL
MILLSTONE
CORNMEAL
MILLDAM
SIFTER
SHAFT
GRAIN
BRAN
GEAR
RYE

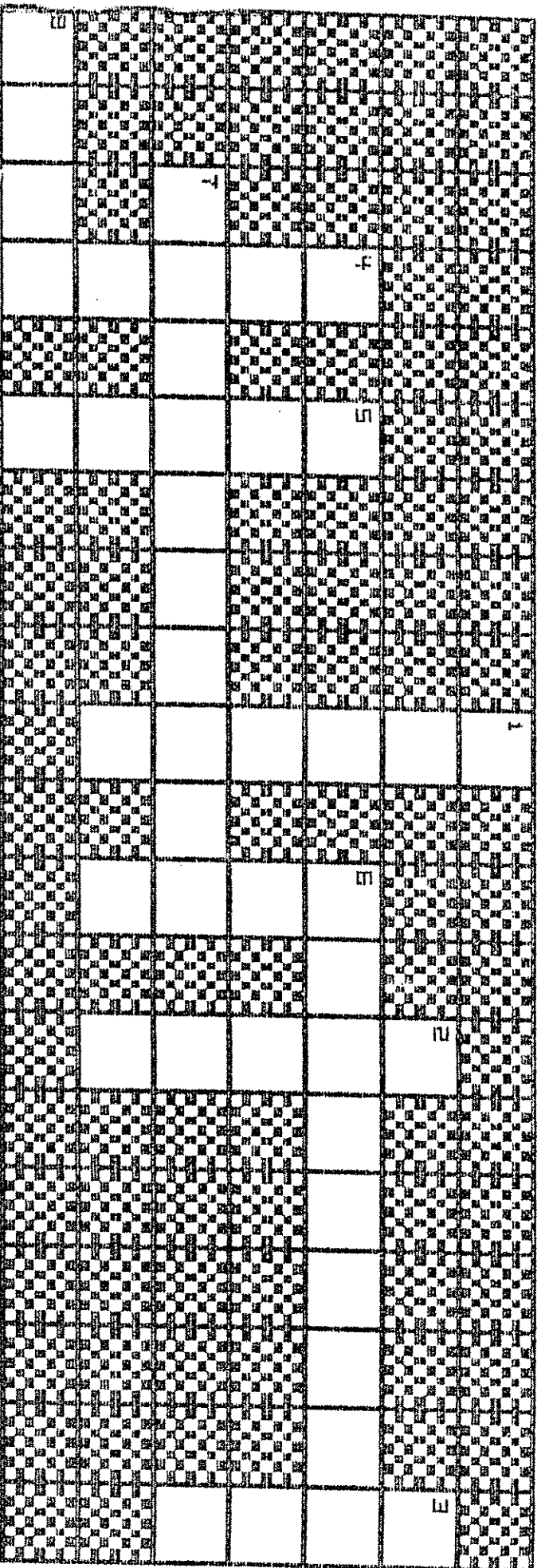
BEVELEDGEAR
MILLWRIGHT
ENDOSPERM
BUCKWHEAT
MILLRACE
PINSTOCK
TURBINE
PULLEY
WHEAT
FLUME
BINS
CORN

ELEVATORLEG
BREASTSHOT
CONVEYORS
UNDERSHOT
MILLPOND
OVERSHOT
HOPPER
MILLER
FLOUR
GERM
BELT
MILL

Answer Key for: Gristmills

..C.CORNERMILL
..O.GI...O.W...B...
HOPPERL...V...U...
..R.U...N...L...G...S...P...A...R...Q...
..N...D...I...W...L...L...G...O...N...R...
..L...E...S...I...E...D...I...V...H...E...O...
..A...Y...P...G...H...A...E...L...Y...B...I...A...M...T...
..U...R...J...T...A...S...O...N...S...T...A...R...A...N...D...P...E...N...S...T...L...E...
..B...R...H...O...S...T...U...R...O...B...I...N...S...E...L...
..R...L...U...N...D...E...R...S...H...O...R...T...I...N...S...L...P...O...N...
..G...A...I...Y...M...I...L...L...F...L...L...O...C...K...
..S...L...C...O...L...L...O...L...T...F...L...L...O...C...K...
..T...L...A...L...L...O...U...R...E...K...
..S...R...Y...K...A...B...R...A...N...
..H...O...C...E...M...
WATERWHEEL

GRISTMILLS



DOWN CLUES

- A simple machine with a rope around a wheel.
- Grain meal that is ground very fine and used to make bread.
- A simple machine with a toothed wheel.
- The seed of cereal plants like wheat and corn.
- A cereal grain that is ground into flour and used to make bread.
- A building with machinery that grinds grain.

ACROSS CLUES

- 6. Large, thick, round stones between which grain is ground.
- 7. A large wheel that turns by the flow of water and works machinery in the mill.
- 8. A grain ground into meal to make cornbread.

WORD LIST: GRISTMILLS

- | | | |
|-------|-----------|------------|
| CORN | GRAIN | PULLEY |
| FLOUR | MILLSTONE | WATERWHEEL |
| GEAR | MILL | WHEAT |

Mills

G	B	D	N	B	T	D	O	Z	N	H	B	X
F	A	X	L	R	Y	E	B	I	M	W	X	Y
G	M	G	B	A	M	P	K	U	T	H	O	D
E	C	O	R	N	R	R	E	A	D	E	P	P
R	F	F	H	C	O	N	N	M	E	A	L	G
M	I	L	L	P	P	O	D	I	G	T	N	H
R	C	O	R	N	L	O	O	L	R	B	J	M
W	N	U	H	P	K	S	S	R	I	G	U	J
D	G	R	A	I	N	P	P	A	S	W	X	E
R	B	U	C	K	W	H	R	C	T	R	K	U
J	G	C	T	T	Y	N	E	M	M	B	E	Q
E	S	V	Y	U	S	H	R	E	I	R	G	Y
J	H	R	Q	Z	H	Y	M	P	L	B	E	R
R	M	W	B	U	M	M	F	F	L	E	A	N
Y	Z	U	B	U	U	U	S	C	V	C	R	N

Can you find these words?

ENDOSPERM
GRISTMILL
MILLPOND
WHEAT
BRAN
CORN

CORNBREAD
CORNMEAL
PULLEY
GRAIN
BELT
MILL

BUCKWHEAT
MILLRACE
FLOUR
GERM
GEAR
RYE



Flour was bagged on the first floor of the mill, the area became very dusty with a fine layer of flour over everything in sight—including the miller!

Grist Mills

Applied Arts Pub.
Lebanon, Pa. 17042

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