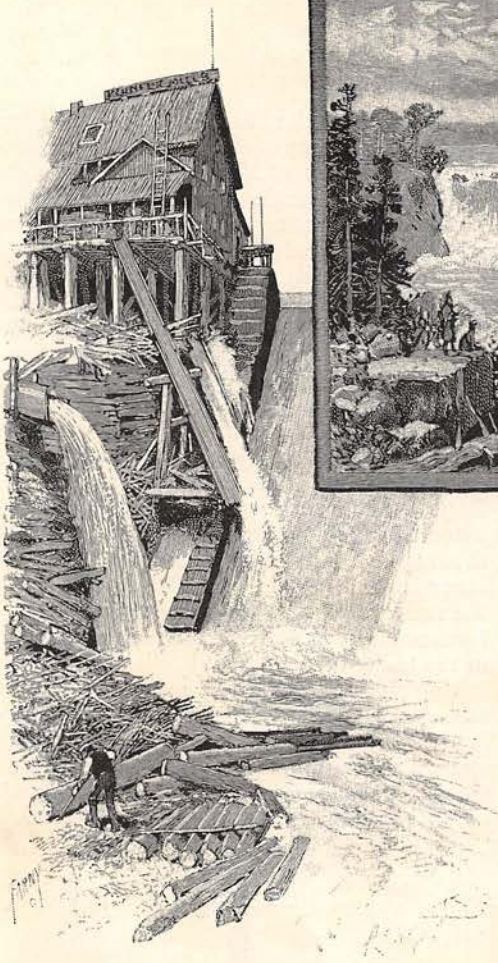
THE FLOUR-MILLS OF MINNEAPOLIS.

IN this age of shams, adulterations, and frauds, it is a pleasure to become acquainted with a city that owes its growth and prosperity to the manufacture of a good, honest article, and to earnest efforts to improve the quality of that article so as to make it the best of its kind to be found in the markets of the world. Such a city is Minneapolis, in the State of Minnesota. Its remarkable development in recent years from an obscure village to a handsome, busy, energetic town of one hundred and thirty thousand inhabitants is due partly to its saw-mills but chiefly to its flour-mills. The latter have multiplied in number and grown in dimensions and spread their names wherever commerce carries the breadstuffs of the West, because they make a grade of flour nowhere surpassed. The word Minneapolis on the head of a flour-barrel has become a guaranty of the excellence of its contents. The millers of Minneapolis have sought out the best inventions, avoided cheap processes, stopped at no expense to get the best results, and trusted consumers to know a good thing and to buy it at a fair price. They have made a great deal of money; other industries have gathered around their own, and in a remarkably short space of time a great community has assembled at the Falls of St. Anthony, exemplifying to a high degree the best characteristics of Western urban life—indomitable enterprise in business, joined to a love for the refinements and graces of a high civilization. Rapid as has been the growth of the place, there is nothing crude in its appearance. The business thoroughfares are better built than those of many Eastern towns of double its population; the residence-streets are broad shady avenues, bordered by pretty houses, each standing alone in the midst of flowers and foliage, and each having an agreeable individuality; the public schools take rank with those of the New England cities; the numerous church edifices bespeak liberality and taste, and exhibit the large assortment of sects which seem to be essential, in new as well as old regions, to the expression

MARKET-HOUSE AND BRIDGE PLACE.

THE FALLS OF ST. ANTHONY, 1842. (FROM A PAINTING OWNED BY COLONEL WILLIAM S. KING, MINNEAPOLIS.)



OLD SAW-MILL AT THE FALLS.

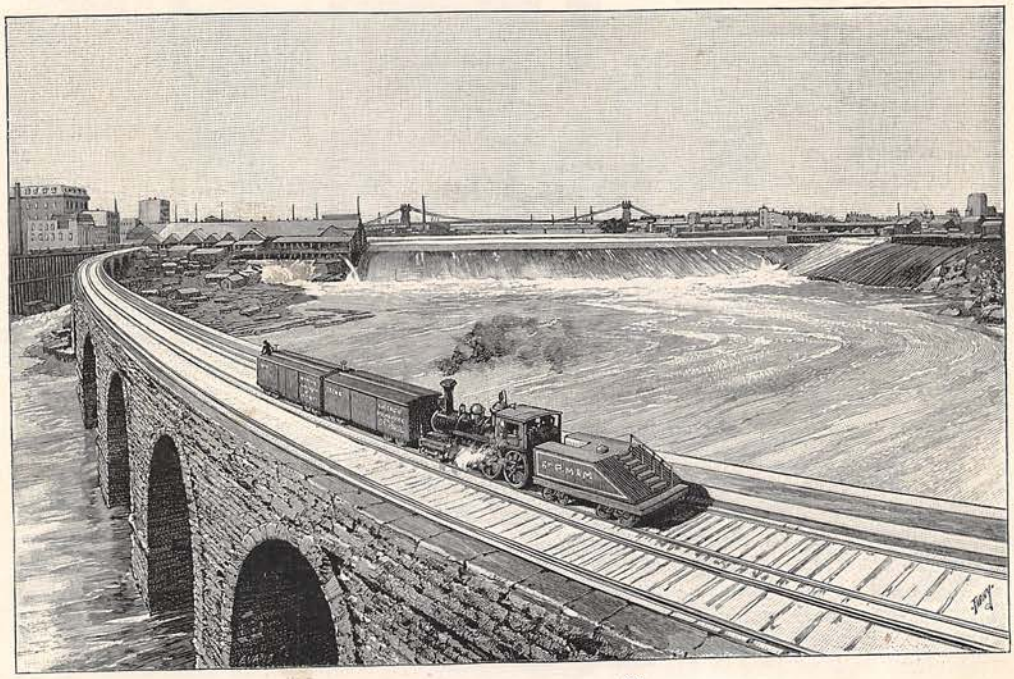
of the religious life of the United States; there is a good street-car system, a steam rapid-transit line, and, what is of more importance, the beginnings of a good sewerage system; and the shops are spacious and full of attractive wares. Indeed, one can live on as easy terms with modern culture and comfort in this new town on the Upper Mississippi as in Hartford, or Providence, or Albany, or any other of the second-rate cities of the Eastern States, and enjoy besides all the peculiar movement and stimulus of Western life.

All this has been achieved in the face of an obstacle such as no other among the new cities of the West has been compelled to encounter — the existence, close at hand, of an older town of considerable prestige, possessed of rail and water communications and of an established trade. The business center of St. Paul is only seven miles distant from that of Minneapolis, and the corporate bounds of the two municipalities touch. St. Paul is the capital of the State, and stands at the head of navigation on the Mississippi. Where the steamboat stopped, the town naturally grew up. The trade of the surrounding newly settled country centered there, and it became the terminal point for the railroads building into the North-west from Chicago and Milwaukee, and the starting-point of the railroads leading to still newer regions in northern and western Minnesota and Dakota. Any plan for developing a second city on a site just around the bend of the river and almost within view from St. Paul might well have seemed chimerical forty years ago. The census of June, 1860, gave St. Paul 10,600 inhabitants, and Minneapolis 5809; that of 1870 showed St. Paul to have 20,300, and Minneapolis 13,066. By 1880 Minneapolis had passed its rival in the race, having 46,867 inhabitants to St. Paul's 41,498. According to the State census of 1885, Minneapolis had 129,200 people, and St. Paul 111,397.

The first and enduring impetus to the growth of Minneapolis was the superb water-power furnished by the Mississippi River at the Falls of St. Anthony. The great river leaps over the soft limestone rocks in a sheer plunge of about twenty-five feet, which with the descent of the rapids above makes eighty-two feet fall within the limits of the city. Level banks on each side of the stream afforded ample opportunities for mill-sites, and the volume of water was so great that there was no fear of its failing in summer droughts. The pictures of the Falls of St.

Anthony which most of us remember to have admired in the school geographies bear no sort of resemblance to the real falls of to-day. There are no forests now, no island, and no rocks, and in place of the wild fall there is only a planked water-slide that looks like a mill-dam — an enormous and magnificent mill-dam, truly, but nevertheless a mill-dam. The whole sweep of the fall has been covered with an "apron" of planks to prevent the rocks from being worn away, and to save the cataract from being converted into a rapid. The real dam, a short distance above the falls, affords power to numerous saw-mills, and within it there is a boom to catch logs. In the winter and spring the falls, thus tamed and fettered, are still very beautiful, the rush of waters over the symmetrical curve of the dam affording a striking spectacle; but in summer, when most of the volume of the current is taken out to feed the mill-races, there is little to be seen but an imposing structure of dry planks.

The United States Government built the plank covering to the falls and the dam above, and maintains them. This statement struck me as a joke when I first heard it. The functions of government as construed by Congress in appropriation bills are very elastic, but I had never imagined that they could be stretched to apply to the building of mill-dams. Congress did not ostensibly build the Minneapolis dam as a dam, however, but as a work to preserve the navigation of the Mississippi above the falls. If the falls should give way, the water in the upper river would be lowered to such an extent that navigation would be impossible. True, there are no boats running above the falls, and there have been none since the railroads were built, but this fact made no difference in the argument. Somebody might want to run a steamboat at some time in the future. So Congress preserved the falls from destruction by preventing the wearing away of the rock, and in doing so the government engineers incidentally built a fine mill-dam. The dam is not for the public benefit, however, for the companies owning the water-power rights collect the tolls for the use of the water, and none of the revenue goes either to the government or the city treasury.

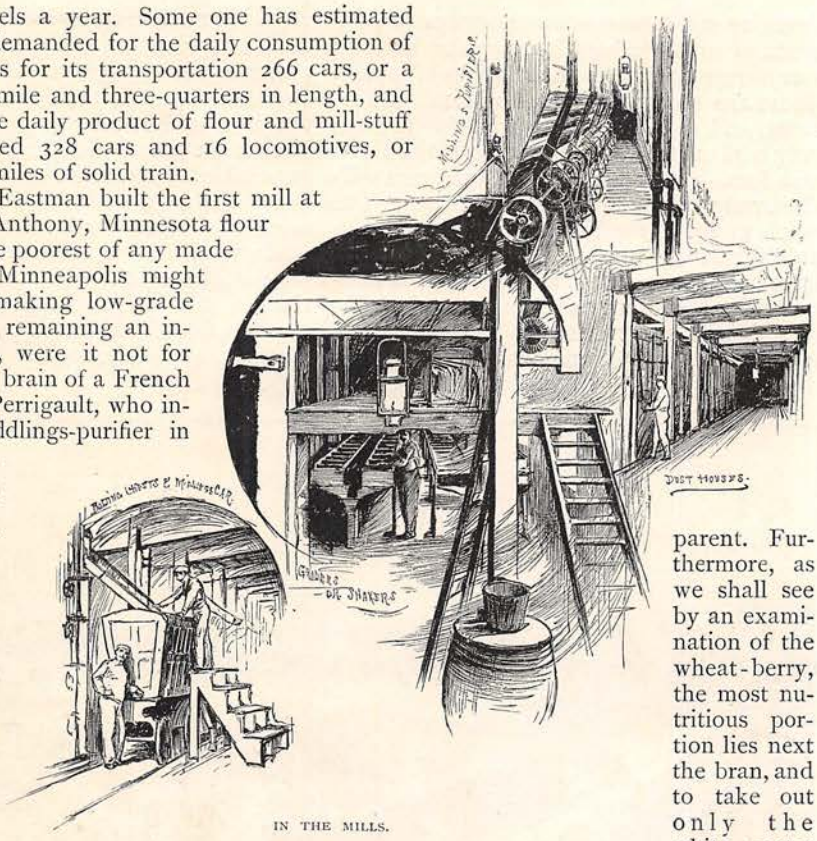


THE FALLS OF ST. ANTHONY, 1885.

The twenty-six great flouring-mills stand in single and double rows on both sides of the river below the falls. They consumed last year about 24,000,000 bushels of wheat and made 5,450,163 barrels of flour — an amount more than sufficient to supply with bread the entire population of the city of New York. The aggregate daily capacity of the Minneapolis flour-manufacturing concerns is 33,973 barrels, and their wheat-consuming capacity is

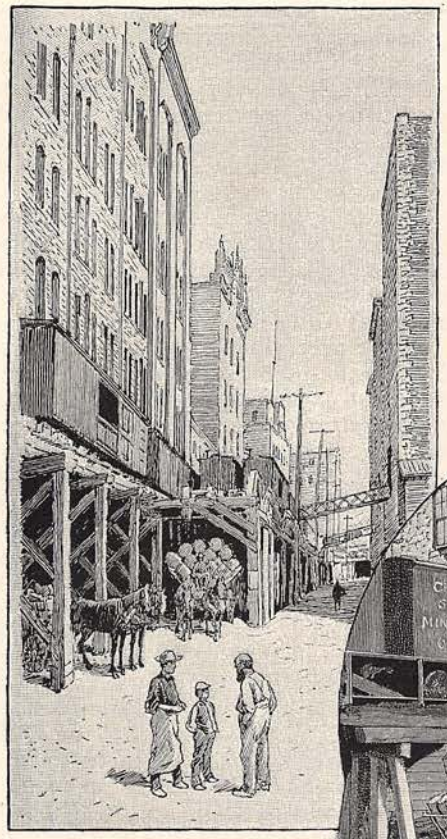
35,000,000 bushels a year. Some one has estimated that the wheat demanded for the daily consumption of the mills requires for its transportation 266 cars, or a solid train of a mile and three-quarters in length, and that to move the daily product of flour and mill-stuff there are required 328 cars and 16 locomotives, or more than two miles of solid train.

When W. W. Eastman built the first mill at the Falls of St. Anthony, Minnesota flour was ranked as the poorest of any made in the West. Minneapolis might have kept on making low-grade flour to this day, remaining an insignificant town, were it not for the investigating brain of a French *savant*, Joseph Perrigault, who invented the middlings-purifier in 1860. The invention was brought to this country by ex-Governor C. C. Washburn of Wisconsin in 1871, and put into one of his mills at Minneapolis. It was soon improved by Nathan La Croix and George T. Smith, practical millers, and in a little while surprising results were developed. The middlings-purifying machine, and the process of gradual-reduction milling of which it forms a part, have built up the beautiful city of Minneapolis, and sent a million of people out on the prairies of Minnesota and Dakota. What a wonderful result from a Frenchman's studies of dust particles floating in the atmosphere and settling in the pigeon-holes of a writing-desk! The statement sounds extravagant, but it is within the bounds of fact. Before Perrigault's invention was adopted at Minneapolis, the spring wheat of the North-west was worth on an average thirty cents a bushel less than the winter wheat of Iowa, Missouri, and Kansas. Why? Because the berry of the spring wheat is small, dark-colored, and hard, and its husk clings tightly. The old process of milling, while it answered well enough for the white, soft-berried winter wheat, did not thoroughly remove the bran from the spring wheat, and left the flour dark in color and of inferior quality. Besides, the relative percentage of flour obtained was small. It did not matter much if a little of the light-colored bran on the winter wheat was left in the flour, but any mixture of the dark bran of the spring wheat was at once apparent. Furthermore, as we shall see by an examination of the wheat-berry, the most nutritious portion lies next the bran, and to take out only the white center of the kernel was to produce necessarily an inferior flour.



IN THE MILLS.

With the enormous difference of thirty cents a bushel against them, farmers in Minnesota were at a serious disadvantage in comparison with those of the winter-wheat belt. The settlement of the fertile prairies of northern and western Minnesota progressed very slowly. Nobody tried to raise wheat in the rich valley of the Red River of the North. Immigration poured into Kansas, but could not be coaxed into Dakota. All this was changed by the middlings-purifier and the new process of gradual-reduction milling. The spring wheat known as "number one hard" became the most valuable of any for the making of flour. The conditions of farming in the North-west were immediately changed. The great natural product of the region came into brisk demand. From the hard wheat of the north-western prairies a flour was made by the mills of Minneapolis which commanded a higher price in New York than St. Louis winter-wheat flour, until then the favorite among Western brands. Population poured into Minnesota and Dakota, railroads were built, towns sprang up as if by magic, and the

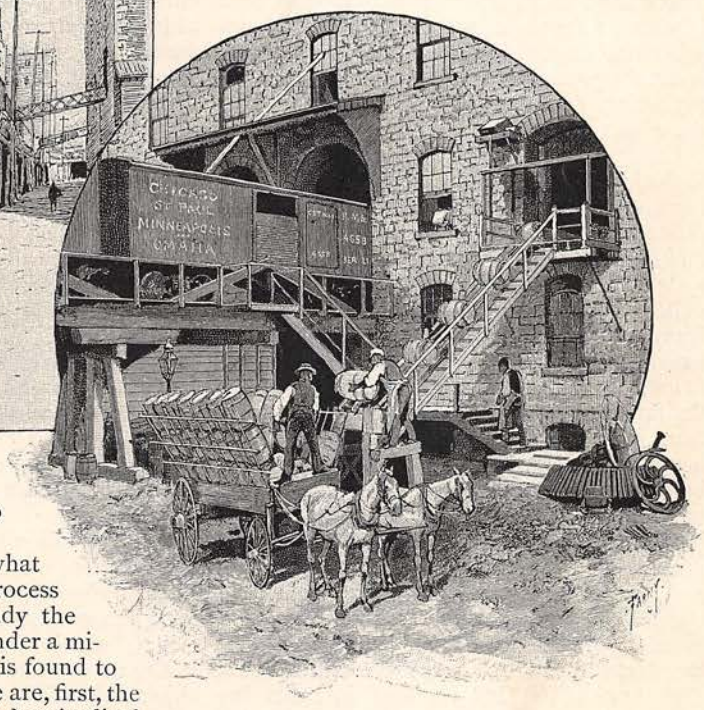


BETWEEN THE MILLS.

bare plains were turned into wheat-fields.

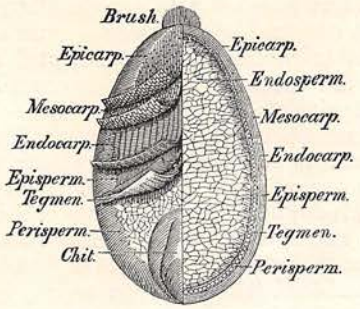
In order to understand what is accomplished by new-process milling, one must first study the wheat-berry. Examined under a microscope, the husk or bran is found to consist of five coats. These are, first, the epicarp, or outer coat of longitudinal cells; second, the mesocarp, or inner coat of longitudinal cells; third, the endocarp, of transverse cells which look like cigars placed side by side, an appearance which has given to this envelope the name of the cigar-coat; fourth, the episperm, or outer seed-coat; and fifth, the tegmen, or inner seed-coat. All these coverings are of woody fiber. The three outer ones have no value whatever as nutriment. The two inner coverings contain a substance called cerealine, for which some nutritious quality is claimed, but not admitted by all millers. Next we come to the perisperm, a layer of gluten-cells containing chiefly albuminoids or nitrogenous matter, and finally to the endosperm, which forms much the greater part of the bulk of the berry, and is composed of starch-grains mingled with minute albuminoid cells. At one end of the berry is a tuft of fine vegetable hairs, called the brush, and at the other is the chit, or germ, which contains the germinal principle.

The Connecticut vegetarian Sylvester Graham, whose name is everywhere in the United States applied to bread made from unbolted flour, was right in his day in saying that much of the most valuable nutritious property of the wheat was taken out with the bran and never got into the white bread-loaf. The perisperm, which contains a large proportion of nitrogenous or muscle-building material, is closely attached to the inner husk, and was in great part carried off with the



BARREL-HOIST AND TUNNEL THROUGH THE WASHBURN MILL.

bran in the old process of milling, leaving the bolted flour somewhat impoverished by its loss. The new or gradual-reduction process, however, saves nearly all of this layer of the wheat-berry. It is a mistake to suppose that the bran itself is of any value as nourishment. The fibers of wood which compose it are of no more use as food than chips or shavings. They produce a mechanical, irritating effect on the digestive apparatus, but that is all. The devotees of Graham bread, who imagine that they are benefiting their stomachs and bracing up their bodies by eating a quantity of bran every day, are radically wrong. Perhaps they get some gain from taking less fine concentrated food, but vegetables or fruit would serve



THE WHEAT BERRY.

the purpose better than the husks of wheat. The white loaf made from new-process flour contains a much larger proportion of food-substance than the Graham loaf of unbolted flour, the percentage of phosphates and gluten being greater in the white flour than in the wheat itself.

Credit is universally given in Minneapolis to the late Ex-Governor Cadwalader C. Washburn of Wisconsin for the introduction of new-process milling, both as concerns the French middlings-purifier and the Hungarian roller system. This honor is freely awarded by millers who were Washburn's rivals in his lifetime, as well as by those who were his business associates, and by the citizens of the town generally. He is always spoken of as the father of modern milling in America. A man of strong will, sturdy integrity, kind heart, and great enterprise and courage in business affairs, he impressed himself strongly on his time, in the North-west, and has left a record which two States cherish with equal pride. His home was at Madison, Wisconsin, and his public career as a general officer in the Union army during the rebellion, as a member of Congress both before and after the war, and as Governor, was identified with that State; but his business interests lay in his later years chiefly in Minnesota. He belonged to the famous Maine family of Washburns, and was one of seven brothers, five of whom distinguished themselves in public life. Four occupied seats in Congress from four different States — Israel from Maine, Elihu B. from Illinois, Cadwalader C. from Wisconsin, and William D. from Minnesota. Israel and Cadwalader C. became Governors of their respective States, and Elihu B. and Charles A. represented the nation at foreign courts. Cadwalader C. was also a Major-General of Volunteers. He was born at Livermore, Maine, in 1818, and died at the Hot Springs of Arkansas in 1882. During the later years of his life he built the great mills at Minneapolis which bear his name and which were his special pride.

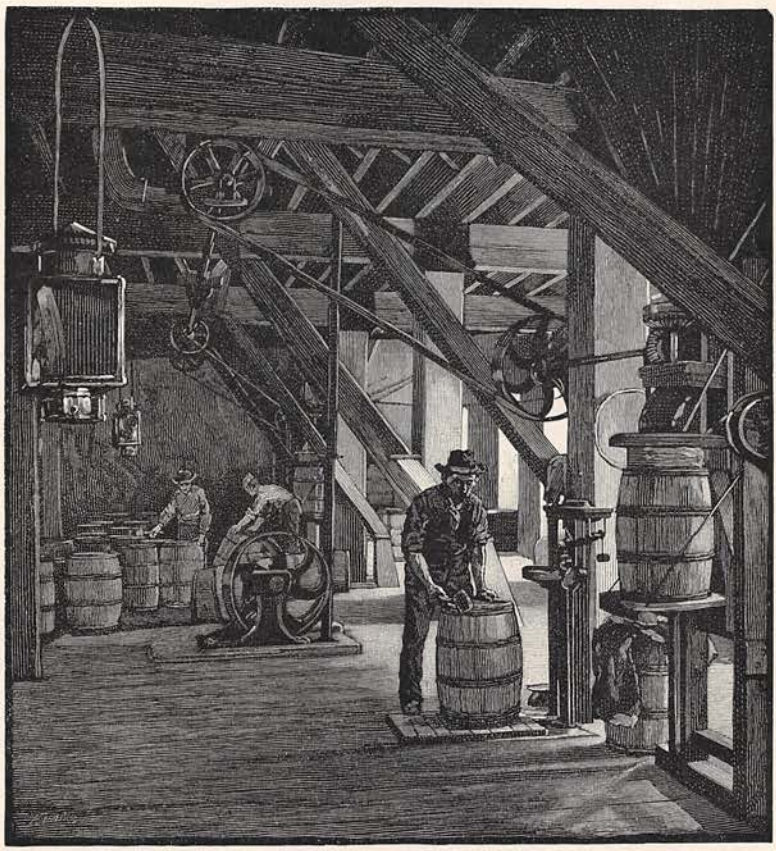
The strength of Governor Washburn's character was strikingly shown by his behavior in the face of the terrible calamity which destroyed his mills in 1878. One evening in May of that year, just after the day force had left the big Washburn Mill and before the night force had all come, the flour-dust that filled the air and covered the walls, floors, and machinery took fire and exploded with a destructive force as tremendous as that of dynamite. In an instant the towering structure of solid stone was changed to a heap of ruins. The fire was blown into four other mills near by, and one after another blew up and crumbled into confused heaps of stones and machinery. The explosions succeeded each other at intervals as regular as if a battery of siege-guns had been fired in order. Eighteen men were killed. Half the milling industry of Minneapolis was obliterated, and the whole city was appalled at the terrific effects of a destroying agency the existence of which had hardly been suspected. News of the tragedy came to Governor Washburn at his home in Madison. He had an appointment for the next morning with the Regents of the University of Wisconsin to determine upon a site for an astronomical observatory, the money for building which he had presented to the institution. The Regents met, supposing that the Governor had left for Minneapolis as soon as the news of the destruction of his mills had reached him. To their surprise he walked into the room promptly at nine o'clock, as calm as though nothing had happened, and insisted on dispatching the business before the Board instead of talking about the disaster. Next day he stood by the smoking ruins of his great mills. Friends gathered around to condole with him on the destruction of a million of dollars' worth of property. To them he said, "The money loss is not to be considered; I think only of the poor victims and of their families. The mills shall be rebuilt at once." And they were rebuilt as rapidly as the courageous and energetic old Governor could push on their construction.

There have been no more mill explosions at Minneapolis. Science and invention went to work upon the problem of their cause and cure. The deadly dust is now drawn from millstones and purifying machines by air-currents; it is thus captured and confined, and made to yield a tribute of good flour. "The spirit of murder," which, to borrow a line from Tennyson, "lurked in the very means of life," has been exorcised.

A great flouring-mill is a wonderful aggregation of delicate and ingenious mechanical processes. The manner in which the wheat, middlings, and flour circulate through the eight or nine stories, from side to side, from

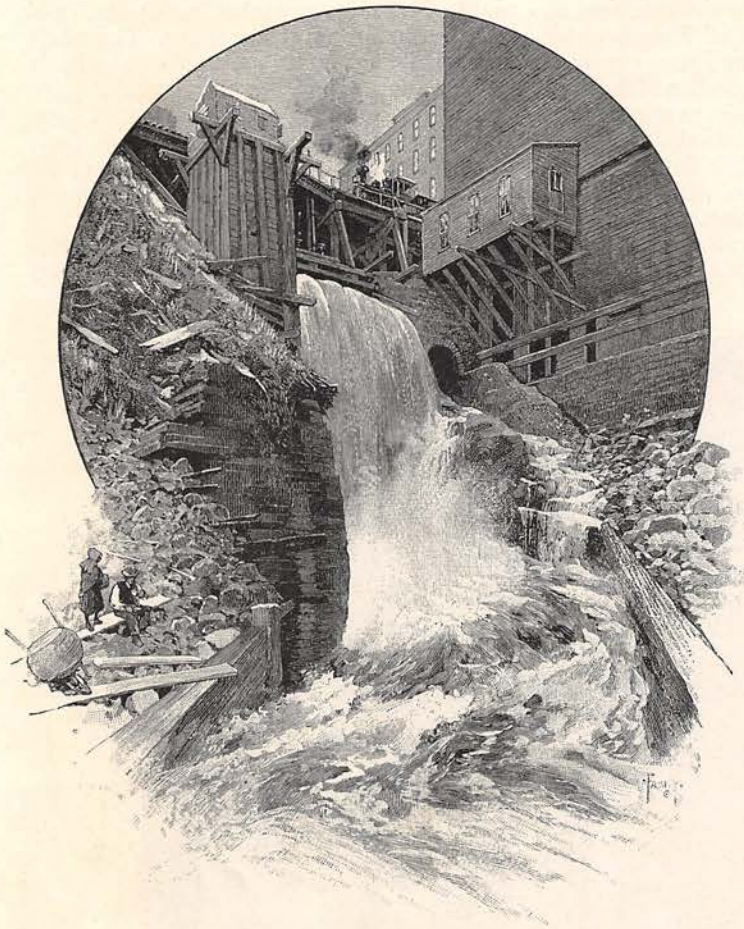
floor to floor, from machine to machine, nowhere needing the help of human hands, makes it seem like one vast living organism. A comparison with the circulation of the blood in a vital frame readily comes to mind. From the time the grain comes into the mill in cars to the packing up of the fine flour in barrels, through all the processes of sifting, cleaning, grinding, purifying, separating, etc., everything is automatic. No workman touches the product save in the way of supervision. Indeed, the night. There is no racket or clatter amid these serried rows of apparatus. The whole great building hums and pulsates with a dull, buzzing noise, but no particular piece of enginery seems to give out a special note. As the sounds of a great city mingle in a subdued roar, so do the thousand voices of the mill unite to produce a single continuous effect upon the ear.

Let us follow the wheat in its journeys through the mill. Descriptions of machinery



PACKING.

laborers stand related to the machines about as the policemen do to the moving crowd in Broadway. They see that order is preserved and the movement is not clogged. The wide apartments of the mill, crowded with machines ranged in regular lines, seem deserted as the visitor roams through them. Perhaps in a distant corner a man may be perceived, slowly moving about, looking phantom-like in his white garments, seen through a mist of flour-dust. He is an assistant miller, who perhaps has a hundred roller mills in his charge, all briskly grinding away from morning to are dull reading at best, and we may agree at the start to look at the various processes only long enough to get a reasonably clear notion of their nature and effects. Our description applies to the Washburn A Mill. The wheat is first received in a hopper holding eight hundred bushels, for weighing; then it goes into a bin and is elevated by buckets on endless bands to another bin in the fifth story. From this bin "conveyers" — long wooden boxes in which revolve large iron screws — carry it along to the cleaning-house, where it goes through machines that take out the sticks,



SLUICE-GATE.

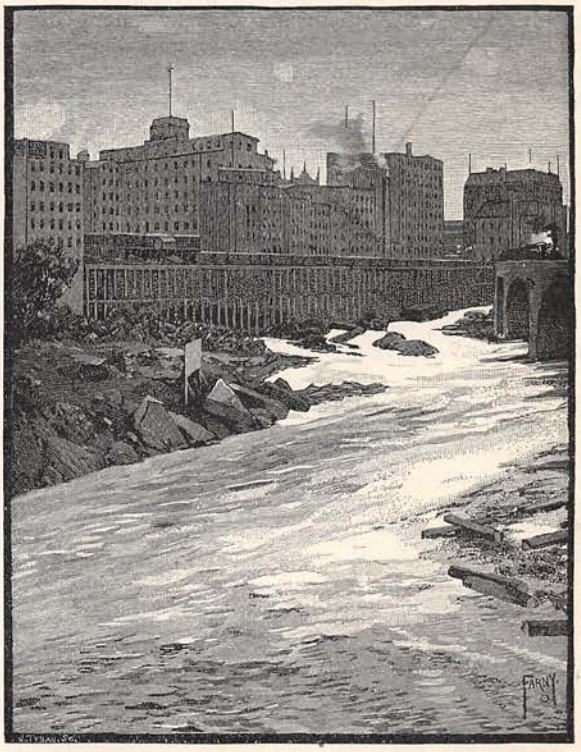
straws, and other coarse impurities. This is only a sort of rudimentary cleansing. The grain is now elevated to the top of the cleaning-house attached to the mill, and deposited in large bins. There are eight of these bins, and their aggregate capacity is eighty thousand bushels. Next it is drawn to the "mill-separators" — machines which by a series of sieves, combined with a powerful suction of air, take out the oats, corn, pieces of earth, and other small impurities. All the refuse is sold for chicken-feed. There still remains an objectionable element in the grain which must be gotten rid of — the seeds of cockle and other weeds, which from their resemblance in weight and size to the wheat-berries have escaped the sifting and blowing process. A long cylinder covered with indentations and called the "cockle-separator" captures these seeds as they roll along, leaving the good grain to pass by. There is still another process before the wheat is ready for milling. Into a big circular iron box, within which are a multitude of revolving brushes, it goes, and every individual grain gets thoroughly dusted before it leaves.

Thus cleaned and brushed and separated from bad company, the wheat is carried into subterranean bins below the mill, which, like those in the elevator, hold the enormous quantity of eighty thousand bushels. These vast reservoirs of good, clean grain are drawn upon for the grinding machinery. The grain on leaving them is carried to the top of the mill, where it descends to the rolls. Crushing the kernels between chilled-iron rollers, instead of by millstones in the old way, is a part of what is called new-process milling. This system was first introduced in Hungary, and when brought to this country in 1876 was speedily taken up by American inventors and improved upon by many devices concerning the number, size, and speed of the chilled-iron cylinders, the shape and position of the grooves cut in them, and other matters. The principle remains the same, however, and we must give foreigners the credit for it. This principle is the gradual reduction of the berries by successive grindings between grooved rollers revolving at unequal rates of speed, which exercise the double effect of crushing and cutting. The roller-mills are small, compact little machines, not as large as a farmer's fanning-mill, and the grain at its first reduction process passes through six of them. After each grinding, or reduction, as it is called, the product goes up several floors above to the separating-reels — long round or octagonal cylinders, covered with bolting cloth. The scalping-reel with its coarse wire cloth lets the middlings and flour through and throws off the broken wheat for the next reduction. The product which passes through the cloth goes to other reels covered with silk cloth of different grades of fineness, which evolve from fifteen to twenty per cent. of a medium-grade flour, separate the loose bran,

and send the middlings along for the next process. In some mills a machine called a "dismembrator" is used, and comes next in order. It has two steel disks, one stationary and one revolving, each carrying a multitude of needles, which work like the pins on a threshing-machine. The effect is to knock off pieces of flour and middlings attached to bran. Next come the sorting-reels, acting on the same principle as the separating-reels, and dividing the middlings, now clean pieces of wheat nearly free from loose bran and flour, into several different grades of fineness.

The middlings-purifiers now receive the sorted products of the reels. In spite of all the sifting and shifting which the crushed grains have been subjected to, there are still specks of bran and considerable dust adhering to the middlings, which if not taken out would make the flour dark in color and otherwise inferior in quality. The purifier was the great invention which revolutionized milling, by making the prime purpose of the grading processes to get as little flour and as much middlings as possible, instead of as much flour and as little middlings, and further, in its results, by adding eight per cent. to the yield of flour per bushel, and by making spring wheat, once despised by millers, yield the best quality of flour. Described in the simplest terms, it is a big box containing sloping frames covered with silk cloth and shaken by an eccentric. Underneath the frames brushes work back and forth to keep the meshes of the cloth from getting clogged by the flour passing through. On the top of the box is a fan-exhaust which keeps up a suction of air through the cloth screens. The essential feature of the operation is a nice adjustment between the pneumatic lifting force of the air-current taking up the fine bran and dust, and the force of gravity carrying the cleansed middlings through the cloth. In this and in the dust-collecting apparatus lies the great value of the invention.

Perrigault, the French *savant*, who died in 1881 at the age of seventy-one, some twenty years ago began investigating the movements of atoms floating in the air of a room. He observed that these molecules described light curves of a nearly horizontal figure; that when they came within one or two centimeters of a table they appeared to be attracted little by little. To quote his own language, "They slowly sank, but they sank; and when they arrived at one or two millimeters only, I saw them throw themselves on the surface of the table, obeying, evidently, a law of attraction, the causes of which have never been explained." Here was the reason why all the shelves of the library or the pigeon-holes of a secretary are found to be charged with an equal cloud of dust. The atoms, moving horizontally, do not fall until they are close to the surface of a solid body. It makes no difference how high the shelf is, or how small the pigeon-hole, the exposed surface collects a quantity of dust proportionate to the quantity of atoms which come within the sphere of its attraction. From this M. Perrigault concluded that by causing the dust-laden air from the middlings-purifier to circulate in passages of great horizontal dimensions and small vertical elevation, he would succeed in securing the deposit of nearly all the dust. He soon invented an apparatus which was successful beyond his hopes. This apparatus, a good deal modified and improved by American inventors, is called the "dust-collector," and is a big wooden box divided into many compartments, in each of which is a blanket-covered frame of zigzag shape. The dust-laden air is drawn successively into these compartments. When the blanket is loaded a valve is closed, and another opened into the next compart-



A GROUP OF MILLS AS SEEN FROM THE RIVER.

ment; the dust is shaken down into a conveyor which takes it to a bolting-reel, and from it is obtained considerable low-grade flour.

The middlings are not yet ready for the final reduction into flour. There still remains an element to be extracted and cast out — the germ, which, being of about the same size and shape as the middlings themselves, has accompanied them in all their progress. The germ is of a yellow color and a rather oily nature. If retained it makes the flour yellow and sticky. It is nutritious, however, and in England a food for infants is prepared from it. To get rid of this element, the middlings are put through roller-mills having smooth rolls of iron or porcelain, which flatten the germs so they can be sifted out by bolting-reels. The extracted germs are added to bran to make feed for animals. Now, at last, thoroughly purified, the middlings are raised to the eighth floor of the building and deposited in seven large bins according to fineness.

The purified middlings freed from germs go through from one to six additional reduction processes by rollers before the final grinding, in each of which some flour is taken away. In the Washburn Mills the last grinding of the middlings is done by stones. Some mills use no stones at all. There is a difference of opinion as to whether stones can wisely be abandoned altogether. The gradual-reduction process in connection with the middlings-purifier can be wholly performed by stones, and was thus carried on at Minneapolis until the introduction of rolls. Of late the tendency in all mills in this country and in Europe is towards the entire abandonment of stones, but many of the best millers claim that this tendency has gone too far, and that the old-fashioned upper and nether millstones, which date back to prehistoric times, will in future have a place in all large mills which seek to produce the highest grades of flour.

We have not yet followed the flour to the last process — that of packing into barrels. This is performed by a rising platform pushing the barrel up around a sheet-iron cylinder communicating with the flour-bins on an upper floor, and covering it as it is filled. In the mouth of the cylinder is a revolving wheel with blades which cut the flour out of the cylinder and pack it in the barrel. A scale contrivance stops the machine when the exact number of pounds have been packed. The barrel is then headed by hand — the only manual-labor process from first to last in the whole progress of the wheat-berry to the flour-barrel.

The best grade of flour is that ground from the purified middlings, because it contains the largest percentage of gluten; the second best is obtained from the wheat during the processes of crushing; the lowest grade comes from the tailings of the middlings-purifying machines. The product no longer valuable for flour reductions is called shorts, and is sold for feed. If this contained only pure bran, it would be of no value as food for animals, for the husk of the wheat-berry, as we have seen, is not at all nutritious; but in spite of all the crushing and grinding and sifting, some starch and gluten adheres to the particles of bran.

The two chief milling firms of Minneapolis are Washburn, Crosby & Co., at the head of which is John Crosby, an associate of the late Governor, and Pillsbury & Co. The Pillsburys have also an ex-governor in their firm, John S., who was Governor of Minnesota beween 1876 and 1882. There are four of them, two brothers and the two sons of one of the brothers — New Hampshire men by birth. Their A Mill is said to be the largest in the world, its capacity being 5200 barrels a day. Their two other mills can turn out 2500 barrels. Their total investment in mills and elevators is two million dollars, and is believed to be the heaviest single investment in the world in a milling-plant. The manager of the firm's affairs is one of the younger members, Charles A. Pillsbury. When he began milling in a small way at the Falls of St. Anthony, Minneapolis flour rated very low, and the peculiar notion concerning it was that the wheat of the neighborhood from which it was ground was of a poor quality. At Hastings, Minnesota, was a mill of pretty good reputation supposed to be grinding a better wheat. Mr. Pillsbury went to see it, and as he walked through the mills he took some wheat from the hoppers to chew, as millers are in the habit of doing, and managed to put a few handfuls in his pockets. When he got home he compared the kernels carefully with those his own mill was grinding, and found there was no difference. He then made up his mind that it was better milling and not better wheat he needed, and for years he bent his energies and resources to improving his machinery and processes. Next to Governor Washburn, he was the first to adopt the middlings-purifier.

While special honor is due to the Pillsburys and the Washburns for the development of milling at Minneapolis, the smaller millers should come in for a fair share of praise. They have participated in the spirit of the great firms, and like them have labored to produce the best results. The ambition of all has been to produce the best flour that could possibly be made. How profitable their business has been may be gathered from two facts. For three years the patent flour, as it was called, sold at the uniform price of ten

dollars a barrel at the mill, although the price of wheat fluctuated between sixty cents and a dollar and a quarter a bushel. A member of one of the great firms drew out in the course of a few years a million of dollars on an original investment of one thousand. Competition has of late so reduced the profit on Minneapolis flour that the saving effected by putting ten hoops on a barrel instead of twelve is thought important at some of the mills. The palmy days when the margin between cost of production and market price at the mills was two dollars a barrel are gone forever.

For the twenty-four millions of bushels of wheat ground at her mills last year Minneapolis drew upon Minnesota and Dakota, and to some extent upon Iowa, Wisconsin, and Nebraska. Next year she may want thirty millions of bushels, but so rapidly are the prairies of Dakota turned into wheat farms that she will soon not be obliged to seek new sources of supply. During the crop year ending September 1, 1885, she received 32,112,840 bushels, a larger aggregate than even Chicago could show.

With the great Dakota and Manitoba wheat-fields, adding from ten to twenty per cent. to their average with every successive year's immigration, lying close at hand, and with the remarkably productive new grain-belt of the Pacific slope as a reserve accessible by a direct line of railroad, the Minneapolis millers need fear no check to their vast industry for want of an adequate supply of the raw material to manufacture into flour. Indeed, there seems to be nothing to prevent the further growth of the industry. True, it may be argued that the wheat-belt has constantly shifted its location in the past, moving in this century from central New York to Ohio; then to Indiana and Michigan; then to northern Illinois, southern Wisconsin, and Iowa; and later to Minnesota, Dakota, Kansas, and Nebraska. The answer is that it can go no farther west; that somewhere on the continent there must be an ultimate wheat-growing region or regions, just as in Europe there are found such regions in southern Russia and in the plains of Hungary, where wheat has been the staple crop since the days when they were the granaries of the Roman legions; and, further, that experience shows that the prairies of Dakota and Manitoba, and the hilly bunch-grass plains of eastern Washington and Oregon, are peculiarly adapted for the constant production of the king of cereals. And for favorable conditions for grinding wheat no place in the world can compare with Minneapolis, if success is the measure of natural advantages. It is on the highways of rail transportation which lead from the grain-fields of the North-west to the great cities and sea-ports of the East. Nature turns its hundreds of wheels with an unfailing water-power, the climate is healthful and invigorating, and finally, it possesses an enterprising, intelligent, inventive population, made up of excellent elements drawn from the Eastern States, and broadened and energized by the opportunities and the liberalism of Western business life. Its people believe enthusiastically in their city, and work together heartily to further its interests.

Eugene V. Smalley.

TO THE MEMORY OF H. H.

O SOUL of fire within a woman's clay!
Lifting with slender hands a race's wrong,
Whose mute appeal hushed all thine early song,
And taught thy passionate heart the loftier way;
What shall thy place be, in the realms of day?
What disembodied world can hold thee long,
Binding that turbulent pulse with spell more strong?
Dwell'st thou, with wit and jest, where poets may?
Or with ethereal women (born of air
And poets' dreams) dost live in ecstasy,
Teach new love-thoughts to Shakspere's Juliet fair,
New moods to Cleopatra? Then, may be,
The woes of Shelley's Helen thou dost share,
Or weep with poor Rossetti's Rose Mary.

Thomas Wentworth Higginson.