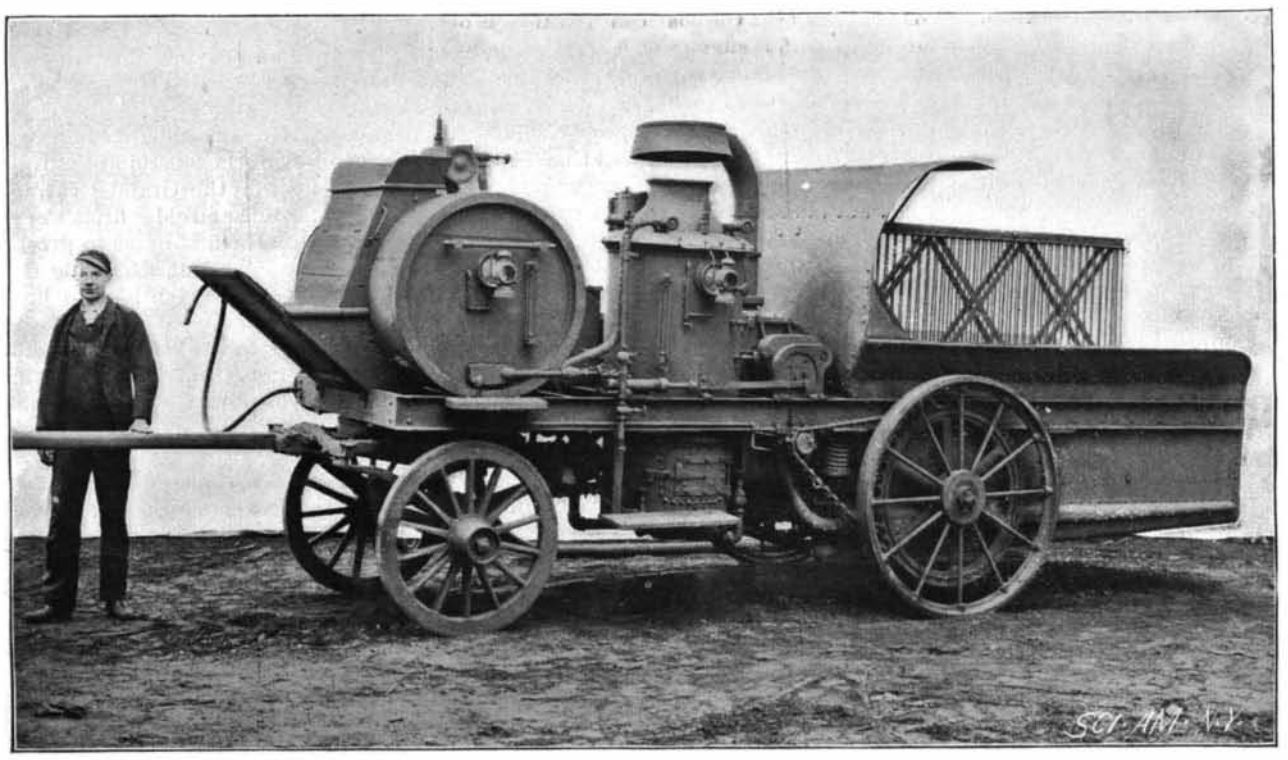
A SNOW MELTING MACHINE.

To a great city snow is rather a mixed delight; in the main streets it interferes with traffic of all kinds and soon becomes of the consistency of coarse sand. In New York a heavy snow storm is the signal for the marshaling of all the forces of the Department of Street Cleaning and the engaging of thousands of additional men and the hiring of three or four thousand carts. Broadway and Park Row are usually the first streets to be cleared; then follow the more important business streets, and finally, if there is not a thaw, the side streets; and for days a solid procession of carts, filled with snow, is seen in progress down the side streets toward the river, where it is dumped. A heavy storm may cost the city from $75,000 to $150,000.



SNOW MELTING MACHINE NOW BEING USED IN THE STREETS OF NEW YORK.

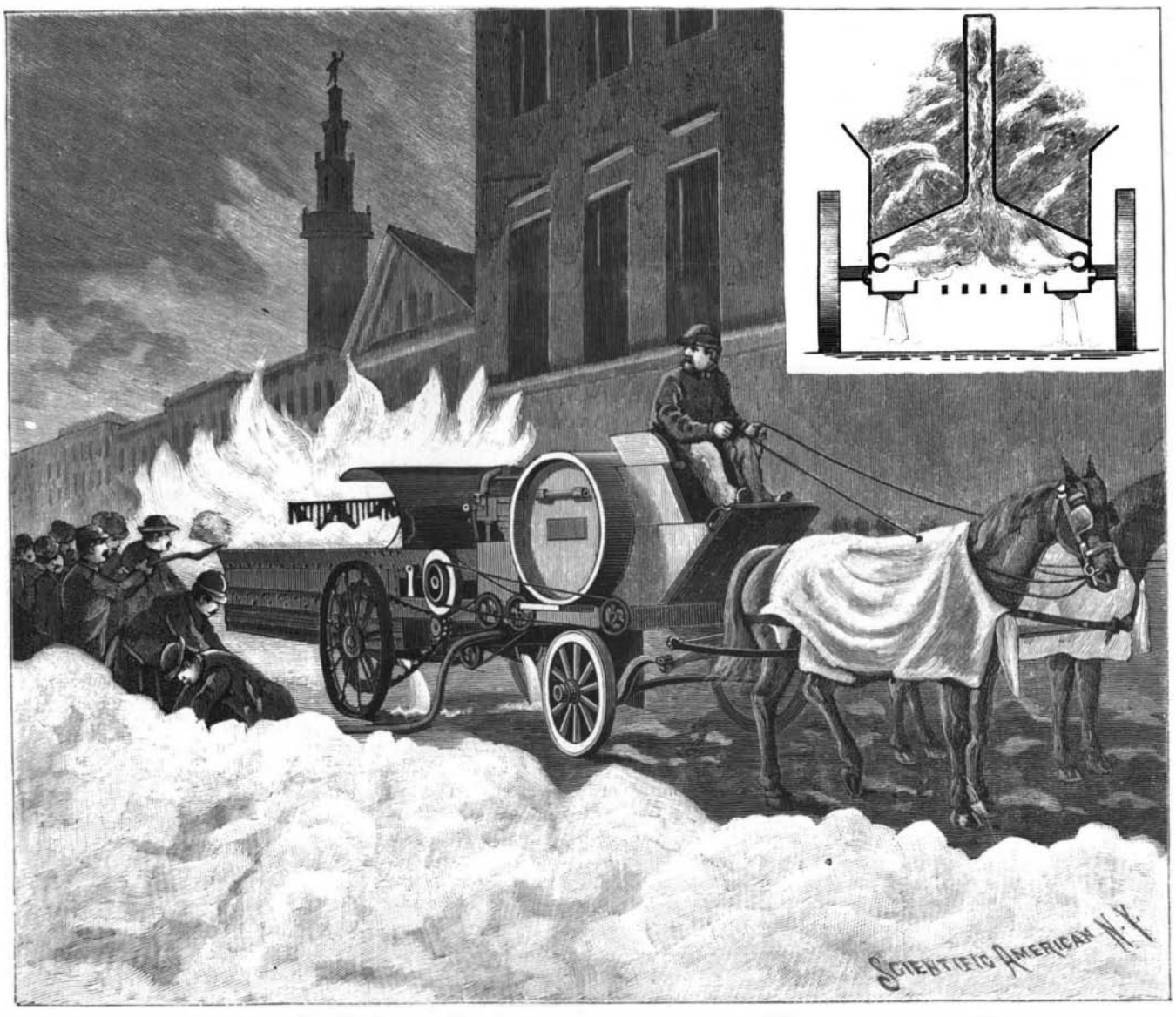
It is only natural that there should have been many experiments directed toward the elimination of the bulky material by some less clumsy and expensive method. Of course the first way out of the difficulty which presents itself is to melt the snow. There have recently been tested in New York two snow melters, one coal burning and one naphtha burning. We illustrate the latter, the machine being made by the Snow and Ice Liquefying Company, of Paterson, N. J. The melter can be carried about by horses or it may propel itself, the rear wheel being connected with an engine by the means of a chain and sprocket wheels. During the recent severe storm it was found advisable to use both horses and the self-propelling mechanism, but ordinarily the self-propelling device should be sufficient, and it possesses great advantages, as the distance which the machine has to be moved is only fifteen or twenty feet at a time.

The melter consists of a four-wheeled vehicle carrying a naphtha tank over the front wheels, a boiler and machinery between the wheels and a long hopper or melting chamber extending beyond the rear wheels. Projecting above the melting chamber are a series of bars strongly braced; their relation to the melting chamber is shown in our small engraving. A curved hood protects the machinery from any snow which careless shovelers might throw toward it.

In brief, the operation is as follows: The machine is drawn to the spot where the work is to be commenced and a barrel of naphtha is pumped by hand into the large tank under the seat of the driver. A light wood fire is kindled under the boiler until about two pounds of steam are raised, then live steam is conducted through pipes into coils situated at the bottom of the oil tank. The heat from this steam vaporizes the naphtha in the tank and causes a portion of it to pass into the separator situated on the top of the large oil tank, and from there it is conducted under the boiler, where it is consumed as fuel. When forty pounds of steam are raised the engine is set into operation, actuating a blower. Some of the air which the blower discharges is mixed with the naphtha vapor in the boiler firebox, so that the steam pressure is readily increased to eighty pounds, and this pressure is maintained during the whole of the time when the machine is in operation.

When it is desired to begin the snow melting, the naphtha vapor from the separator and the air from the blower are turned into the melting chamber and are there mixed and ignited, burning in the twenty-four burners which are arranged like blowpipes at the bottom of the melting chamber. The burners are distributed throughout the length of the chamber at both sides. Air to insure combustion is admitted by holes in the side, and an additional supply is provided by means of forced draught. The relative position of the burners to the gridiron is shown in our small engraving. The burning of the naphtha vapor causes an intense heat which melts the snow at once. The flames blow outward at times through the openings in the gridiron, producing a fine sight. Occasionally a sheet of blue flame rises upward along the gridiron, showing, apparently, that heat is applied to the interior of the mass of snow as well as underneath it. It is possible to discharge the water caused by the melting snow through a hose if desired. The bars of the gridiron are heavy and are strongly braced, so that the shovelfuls of snow are at once broken up and slide down at the side. The flame of the naphtha and air comes into direct contact with the snow, melting it instantly. Everything is done to facilitate the rapid separation of the water and snow, as no heat units should be lost in heating water. The water drops to the ground and is carried away into the gutters and finally into the receiving basins of the sewers situated at street corners. Enormous masses of snow are melted in an incredibly short time. Occasionally a pile of snow that is soggy is pushed down into the melter by a man with a long iron rod used as a poker, in order to loosen it up and make it melt more freely. Fourteen men are necessary to feed the insatiable monster. Besides the men shoveling snow into the machine, two or three men are employed to keep the gutters clear and scrape up the snow that falls from the shovels and the slush around the machine. As fast as the oil is consumed during the running process a new supply is being passed into the oil tank by a pump situated at the front of the machine under the tank. This pump draws the naphtha directly from the barrel. A water tank is also provided to supply the boiler.

When once started, the supply of steam and oil is maintained and the machine can be run for twenty-four hours or longer if desired, the shovelers being changed as they finish their day's work. As the water has a temperature ranging from 62° to 80° F., it flushes and cleanses the gutters and sewers. After a heavy snowfall there is always great trouble in the hiring of men and carts, but with the snow melting machines the difficulty would be lessened. The unfortunate feature of the use of carts in carrying away snow is that the horses cannot be worked more than eight or ten hours. With ice melting machines running day and night each may be reckoned as the equivalent of between thirty and forty carts, according to the length of hauls, and during the summer the machines are stored away and no expense is incurred for keeping horses.



REMOVING SNOW FROM STREETS BY THE PROCESS OF MELTING.

The melting capacity of one of these machines is usually a cubic yard of snow per minute; the cost of a ten hours' run is as follows: 500 gallons naphtha at 5 cents, $25.00; engineer, $3.50; assistant engineer (or help-

er), $2.00; two teams (drivers), $10.00; fourteen shovelers at $2.00, $28.00; four shovelers (piling) at $2.00, $8.00; two men with brooms, $4.00; sundries, oil, waste, etc., $1.00; total, $81.50.

The Beet Sugar Industry.

Nearly a century and a half has passed since Maggraf, a German scholar, announced in 1747 to the Berlin Academy of Sciences his discovery of a method of producing sugar from the beet, says the New York Sun. Half a century later, his pupil, Achard, explained to the same academy his improvements in that process. Then the industry began to grow steadily, and under the encouragement of Napoleon it made considerable progress in France. Indeed, during the wars of Napoleon, when the sugar-laden merchantmen of France and of Germany, coming from the West Indies, were so harassed as to be nearly driven from the seas, the times were favorable to beet sugar production in Europe. The decade following 1815 saw a great reaction, with the beet fields of France and Germany largely turned to other uses, and the beet sugar factories mostly closed. Then came a revival that lasted. The beet sugar industry was destined, however, to remain still a long time a target for the humorists, and one grave statesman compared it with the project of Swift's famous philosopher who sought to extract sunbeams from cucumbers. But it grew in spite of ridicule. Mr. E. Sowers, who, in the North American Review, urges a wider field for it in America, says that the production of beet sugar in France for the year ending July 31, 1830, was 4,380 tons; in 1840 it was 22,784, in 1850 it was 62,165, in 1860 it was 126,479, in 1870 it was 282,136, in 1890 it had reached 750,000 tons. Again, in 1830, the consumption per person in France was two pounds; in 1865, fourteen pounds; in 1890, twenty-six pounds.

A like growth in Germany is noted during a period of about fifty years.

	Sugar, tons.	Molasses, tons.
For 1840	13,445	8,955
For 1850	52,586	19,877
For 1860	126,526	35,224
For 1865	180,000	50,544
For 1871-72	186,442	63,892
For 1881-82	599,722	150,813
For 1889-90	1,213,689	240,797

Indeed, beet sugar has for Germany become an important article of export. In the year 1877 the amount sent out of the country was 57,753 tons. Ten years later it had increased more than tenfold, to 643,340 tons, while in 1890 it had reached 718,985 tons. In 1890 our country paid Germany $16,000,000 for about 200,000 tons of beet sugar, and Mr. Sowers observes that this was "nearly three times more than it paid for any other article" imported from that land.

How does this industry stand in the United States? Mr. Sowers tells us that in 1891 the production here was 12,004,838 pounds; in 1892 it was 27,003,322 pounds; in 1893 it was 44,836,527 pounds. He has no figures for 1894 and 1895, but if the increase has continued at anything like the rate just noted, the product by this time must be very large.

Parts of Kansas, Nebraska, the Dakotas, California, and Utah have already been devoted to sugar beet culture, with most promising results. The rich soils and warm and even climate of California and Utah, especially when aided by irrigation, are suited to an abundant and excellent yield. In 1892 California alone produced about 20,000,000 pounds of beet sugar. Nebraska and the Dakotas add to a natural richness of soil sufficient rainfall in the season of rapid growth. The farmers of Nebraska find that the temperature for June, July, August, and September is so high and even as to bring the beet to full maturity early in October. That State produced 5,835,900 pounds of beet sugar in 1893, or more than double the amount of two years before, and it also has one of the most successful beet sugar factories. Improvements in making the sugar go on, and a better knowledge is steadily gained of the conditions which tend to increase the yield.

A summary of facts given by Mr. Sowers in regard to this industry will be of interest:

"The yield of sugar beets varies from twelve to forty tons per acre. The best land, with good cultivation and a favorable season, will yield from twenty to thirty-five tons per acre, but the crop would be hardly profitable at a yield of less than twelve tons per acre. In California the greatest production from a single acre of land was a little more than forty tons of beets; but this is an unusual yield. The estimated cost of production per acre is about fifty dollars. In the present condition of the methods of manufacture, from eight to twelve pounds of beets are required in the making of one pound of sugar; the quantity varies according to the greater or lesser richness of the beets in sugar. The price changes with the conditions of the market. About four years ago beet sugar from Germany was landed on the wharves of New York at a cost of three dollars and eighty-one cents a hundred pounds. It rarely costs now above five cents a pound."

During the last sixty years such improvements have been made in the process of manufacture that, instead of converting from 4 to 5 per cent of the beet into sugar, 12 to 16 per cent are converted now, and the cost of production per pound, which was once from 8 to 12 cents, is now only from 2 to 4. The average cost here in 1893 was 3 cents, and 24,000 acres were used for growing sugar beets, which brought to the farmer an average price of $4.50 a ton. An acre produced 3,661 to 4,620 pounds of sugar. In that year there were seven factories in the country, with a capital of about $2,000,000.

If the figures of Mr. Sowers are correct, the annual consumption of sugar per capita in Germany is 18 pounds; in France and Switzerland, 26; in the United States, 44, and in England, 60. These are extraordinary differences, and England appears as having the sweet tooth. We are further assured that France, Germany, and Austria produce beet sugar enough for home consumption, and import little sugar, while Germany and France export large quantities. In 1892 Germany sold to English purchasers alone nearly 600,000 tons of beet sugar, the product of their factories and fields.

As to our country, it is declared that we "spent annually about $135,000,000 for sugar, of which more than eight-tenths goes to foreign countries. We consume one-fourth of the exported sugar product of the world. Fifty years ago, 94 per cent of the annual sugar product of Cuba found a market in Europe; now that proportion of its production is sold in the United States." This last extraordinary statement suggests the vast commercial interest which we have in that island, and its growth in fifty years.

CONTRACTION OF THE FACE IN JUMPING.

In a jump, says Longet, the entire body detaches itself from the ground and floats in the air after the manner of a projectile. The photograph that we reproduce, and which was taken by a photographer of Saint-Die, shows the justness of this comparison perfectly. The stress of impulsion causes a contraction of the entire body. The trunk and limbs at the moment of rising form a rigid and undulated rod.

CONTRACTION OF THE FACE IN A JUMP.

The photograph in question gives the image of a very high jump at the moment that the impulsion is given. It reproduces the body in full stress and in entire contraction. The violence of the stress may be seen from the aspect of the young man's countenance. The nose, eyebrows, eyelids, forehead and neck are violently contracted. The effect is so much the more marked in that the energy of the stress has congested the face.

One might say, from an inspection of the figure, that the jumper was suddenly experiencing a severe pain, and that he was about to burst into tears.—La Nature.

TH. GUILLOZ (Medical Week, June 5, 1896) says that he first successfully employed photography of the retina for clinical purposes in the year 1893. His procedure is based on the following principle: When the pupil is dilated, the fundus of the eye may be illuminated, so as to permit of examination of the retina with a lens, without the necessity of any ophthalmoscopic mirror. The observation is thus made on the reversed image, and it is this image which is fixed by means of a photographic objective. Moreover, as the time of exposure, however short, is an inconvenience, he has constructed a special apparatus for instantaneous photography of the retina. The photographs obtained in this manner show the ophthalmological image reversed, as it appears on examination, with the reflection from the optic disk and cornea; but since then the author, by a new method of illumination has succeeded in getting rid of this reflection.

ECHOES OF THE ANNUAL BICYCLE EXHIBITION.

Although there have been no radical changes in the 1897 model, it is undeniable that this year's bicycle is a much handsomer machine than its predecessor. This is due to the great care and the good taste with which every detail has been designed and finished off. Larger tubing, particularly in the stays and rear forks, the shapely arched fork crown, the compact adjustments of handle bar and seat post, the increased diameter of crank hanger and hubs, have given to the 1897 bicycle an appearance of greater strength and durability without detracting from the general grace and beauty of its proportions.

This was the first impression on taking a rapid survey of the magnificent display shown on the second floor of the Grand Central Palace, where most of the leading and older firms were represented. It was fitting that the first name to greet the eye should be that of the Pope Manufacturing Company, whose senior member is justly entitled to be called the father of the bicycle industry in this country. In speaking of such a progressive firm no higher compliment can be paid to its 1896 wheel than to say that this year's pattern varies from it in few essential particulars, the chief change being in the introduction of direct tangent spoke-studs on the hubs, box fork crowns with a name plate attached (placed there as a protection against the bicycle thief), and improvements in the divided crank shaft, a device which this firm was the first to introduce.

E. C. Stearns & Company had a full display of the famous "Yellow Fellow" wheels, conspicuous among which was the many-triangled truss of the famous septuplet, which had already done duty at the great London and Chicago shows. Another curiosity was the wheel on which Anderson recently reeled off a mile in 1 minute and 3 seconds behind the friendly shelter of a shield attached to a moving train. The gear was one hundred and twenty, and if, as the Stearns Company asserts, the timing was accurate, the feat proves that atmospheric resistance is by long odds the most serious that the bicyclist has to contend with.

The adjoining exhibit of the Remington Arms Company showed the beauty of finish and the close attention to detail which the long experience of the firm in the manufacture of high grade material would lead one to expect. Every part of the machine is made at the works, even to the chain. The bayonet cranks of triangular cross section were suggested, as the name implies, by the bayonets which are made by the firm, and they are certainly adapted to resist the strains to which the crank is subject.

The Lovell Arms Company showed several improvements, including a divided crank axle which is locked by a screw passing through the crank hub. The crank axle is made by rolling up a strip of Swedish plate steel into a hollow tube and welding the longitudinal joint. The bearings are oiled through the axle. In place of a cup they use a two-point bearing cone with the object of diminishing friction.

The Sterling Cycle Works are justly proud of the fact that many of this year's improvements in other wheels had been anticipated in their earlier machines. The Sterling oval fork has been changed very little, if at all, from the original design. They still favor tubing and, relatively to other 1897 wheels, small diameter bearings. The wheel is the lightest appearing machine in the show, and reveals careful work and high finish. It is claimed that the company was the first to use the direct tangent spokes and corrugated hubs. Other new features are the use of cup bearings screwed into the crank hanger, the Morse roller bearing chain and the use of large sprockets.

The Indiana Bicycle Company has turned out an extremely handsome wheel in the 1897 Waverley. The most novel feature is the design of cranks and crank axle. The latter is hollow, and the crank, which is squared at its large end, is let into a slot cut across the end of the axle and held in place by a bolt which passes through the axle. This enables the bearings to be removed from the hanger without altering their adjustment.

The Eagle Manufacturing Company has made a great advance over last year's wheel in the matter of details. It still offers the justly celebrated aluminum rims, which for many years have been the distinguishing feature of the Eagle wheels, but in deference to the popular taste the manufacturers furnish their high grade wheel with wood rims, substituting the aluminum rims if preferred. The changes in the new wheel include a double drop-forged crown, a narrower tread (4⅝ inches), the cantilever front sprocket (a handsome design which has attracted much attention), D forks for the rear wheel, ball retainers for all bearings and a large diameter tapered handle bar, the size at the head being 1⅛ inches. The ladies' wheel, with its elegant and mechanically designed tritubular frame and its aluminum dress shield and rims, is one of the handsomest machines in the exhibition.

The Keating Wheel Company retain the characteristic "curve" in the main tube, put there with the object of resisting more effectually the twisting strains in the crank hanger. The corrugated hubs are cut from the