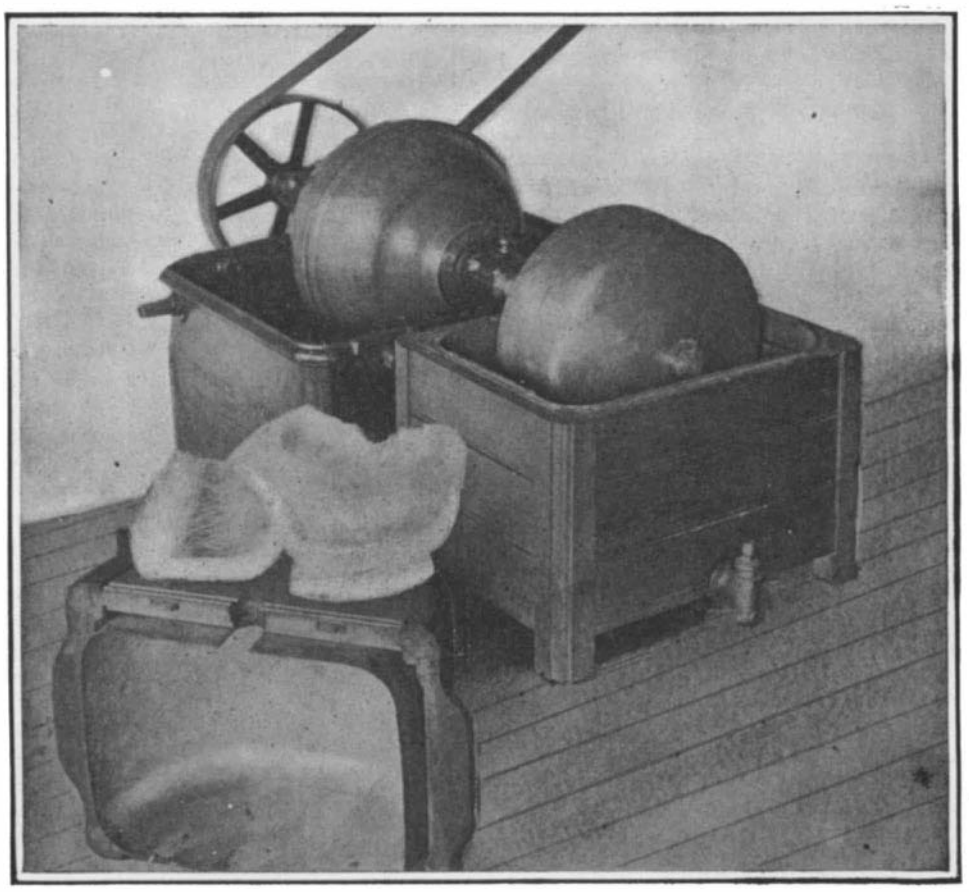
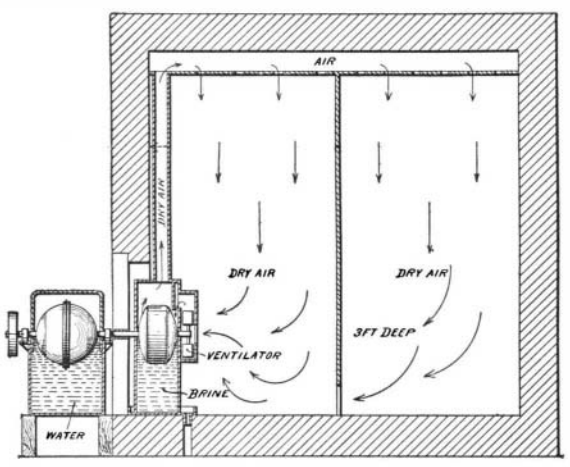
A NEW ICE-MAKING MACHINE FOR DOMESTIC USE.

Nearly all ice-making machines depend for their operation upon the property of certain substances to absorb a large amount of heat when changing from the liquid to the gaseous state. As a rule, anhydrous ammonia is the substance used, and this is forced through a closed cycle consisting of a compression chamber and an expansion chamber. In the latter chamber the ammonia expands into a gas, absorbing heat as it vaporizes. Then it is drawn into the compression chamber by a pump and compressed into a liquid, only to flow back into the expansion chamber and expand into a gas. Thus one chamber of the machine is made cold by the vaporizing ammonia, while the other develops heat because of the compressing of the gas. The heat from the compression chamber is dissipated by a suitable radiator system, while the influence of the expansion chamber can be extended at will by a system of pipes through which brine is circulated.

The difficulty with refrigerating machines as commonly constructed is that long stuffing boxes are necessary to prevent leakage of the ammonia, and the friction developed in these stuffing boxes not only absorbs energy, but generates additional heat. The smaller the machine, the more serious are these losses, because of the pressure that must be maintained, which does not permit the friction to diminish in proportion to the capacity of the machine. For this reason, refrigerating machines for domestic use have not been as economical as those of large plants.



The water tank casing removed to show the two drums. In the foreground is some ice taken from the refrigerating drum.

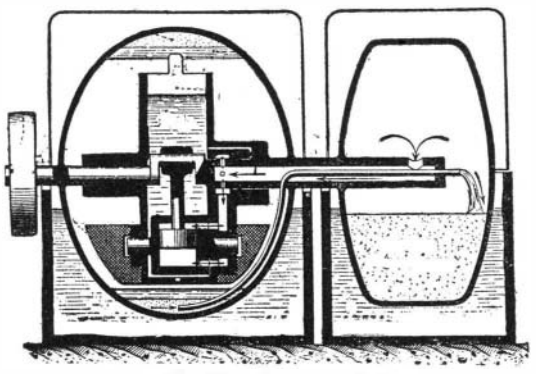


The machine as used with a refrigerator box.

Recently a machine has been invented by Prof. Audiffren, of Paris, based on the same principle as the ordinary ice machine, but so designed as to do away with all stuffing boxes, pressure gages, agitators, valves, or anything that would require the attention of an operator. As shown in the accompanying sectional view, it consists of two chambers or drums, which are connected by a hollow shaft. A solid extension of this shaft passes through the larger chamber, and at its outer end carries a pulley, which provides means for operating the machine. The shaft is sealed into the chambers, so that as the pulley revolves, the chambers revolve as well. Mounted to swing freely on the shaft within the larger drum is a small pump, which is kept vertical by means of a lead weight (of about 70 pounds in the machine illustrated) attached to its lower end. The piston of this pump is connected to a crank offset in the shaft, so that when the pulley is rotated, the shaft revolving with it will operate the piston, the latter being kept vertical by its connection with the weighted compressor. In the smaller machines the drums are charged with anhydrous sulphurous acid instead of ammonia. The pump serves to draw the gas from the smaller or expansion drum through the tubular shaft, compress it into a liquid, and discharge it into the larger or compression drum, whence it flows back through a pipe leading through the tubular shaft into the expansion drum. Here the liquid evaporates, and is returned to compression chamber by the action of the pump. It will be seen that the entire operation is a closed cycle, the drums are hermetically sealed, and there is no possibility for the liquid or gas to escape. Owing to the fact that stuffing boxes are eliminated, friction is reduced to a minimum, and about two-thirds of the power used by other machines of the same size is saved. In order to provide sufficient lubrication, the pump is kept swimming in oil. The pump is fitted with a reservoir capable of carrying half a gallon of oil. The oil cannot escape, and such of it as leaks out of the pump is trapped and returned to the reservoir. Owing to the rapid rotation of the drum, the liquid acid is centrifugally thrown against the inner periphery of the chamber, and any oil that leaks into the chamber is centrifugally separated from the heavier sulphurous acid, forming an annular layer within the acid layer. Our illustration shows the acid and oil in section at the bottom and top of the compressor chamber. At the top of the oil reservoir is a scoop, which extends upward sufficiently to dip into the oil, but without reaching the layer of sulphurous acid. This scoop collects the oil, causing it to fall back into the reservoir.

The machine requires no pressure gages, for the reason that if it heats too much, and the pressures becomes too great, the entire compressor pump will rotate around with the shaft and do no pumping. In other words, the lead weight serves as a safety appliance to control the action of the machine.

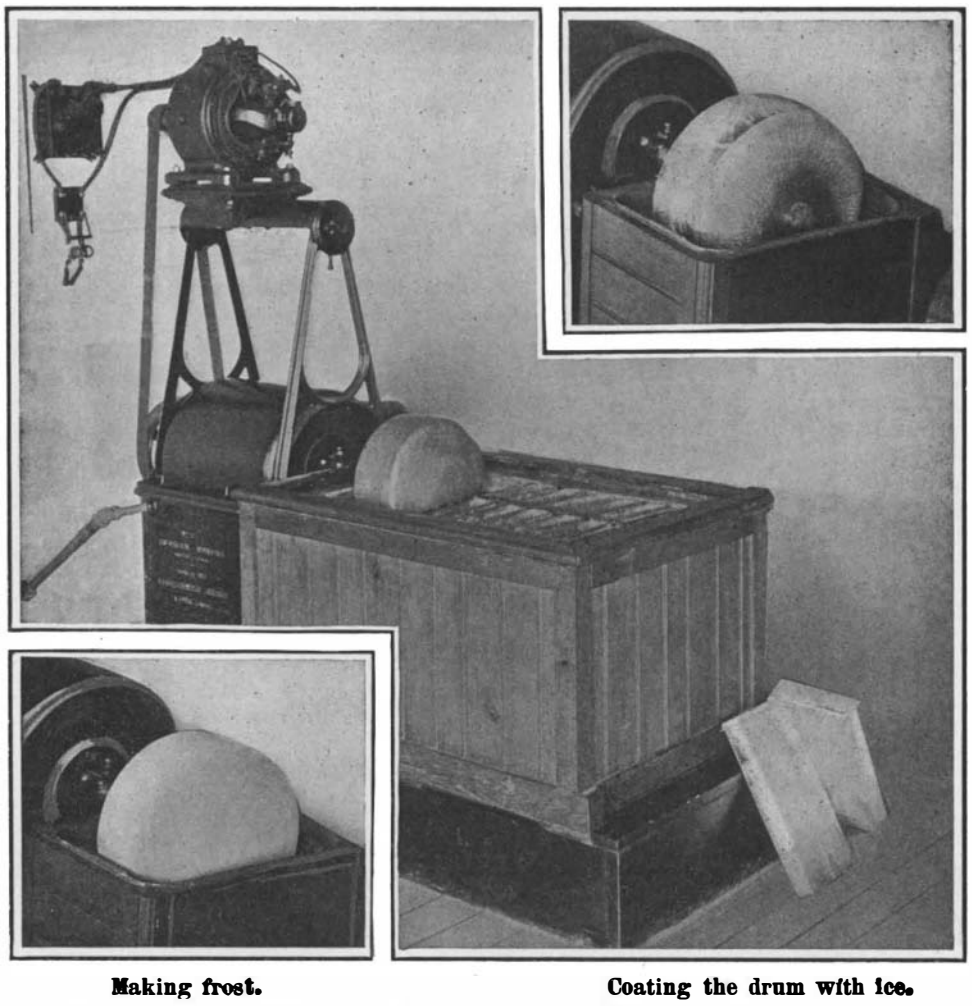
Any form of power may be used to drive the machine. Some of the smallest ones are fitted with a crank, so that they can be operated by hand. The accompanying photographs show some of the uses of this novel machine. The compression chamber is half submerged in a tank of water, which absorbs the heat produced in this chamber. The expansion chamber or refrigerating drum may be used in various ways. One of the illustrations shows the machine after it has been run for a few minutes in the open air with no liquid around it. The chamber is covered with frost, which is merely the condensed and frozen moisture of the atmosphere, which has collected on the drum. The drum may be rotated in a small tank,



The mechanism inside the drums.

in which a small amount of water is placed, and in a few minutes the water will form a layer of ice over the drum. One of the photographs shows the ice-coated drum, while in another view are shown the pieces of ice which have been cracked off the drum. The tank in which the drum rotates is provided with a false bottom in which milk, wines, or any liquid that it is desired to refrigerate may be placed. After running the machine for a few minutes, the refrigerated liquid may be tapped off through the faucet shown in the foreground.

For the purpose of making ice for use in refrigerator boxes, a larger tank is provided. This tank is filled with brine, and is fitted with a number of metal containers in which slabs of ice are formed. Two of these containers are shown in the foreground of one of the illustrations. As the drum revolves, it agitates the brine and circulates it about the metal containers. The water with which these containers are filled is cooled and eventually frozen by the circulating brine, which abstracts the heat and conducts it to the revolving drum. The machine illustrated in the engraving is operated by a one-third horse-power motor, and will freeze forty-eight pounds of ice in four hours. As the heat in the tanks surrounding the compressor drum is apt to rise to a high degree, it is preferable to provide a flow of water through the tank. Where running water is not available, a ventilator is furnished, consisting of a fan attached to the motor, which drives air into the tank and around the



Making frost. Coating the drum with ice.

The ice-making machine and the brine tank in which slabs of ice are formed.

A NEW ICE-MAKING MACHINE FOR DOMESTIC USE.

compressor drum, so as to carry off part of the heat.

Ice cream can be made very quickly by suspending a can with the prepared cream in the tank of brine. The circulating brine will agitate the can sufficiently, so that the cream will be formed without turning any crank.

This form of machine is particularly useful for refrigeration purposes, as the refrigerating drum may be placed within the refrigerator box, and will directly absorb the heat of articles placed in the box without requiring the use of ice. The accompanying diagram illustrates one method of accomplishing this result. The refrigerator box is provided with a compartment at one end, in which the refrigerator drum rotates. A fan serves to draw the air out of the box, bringing it into contact with the refrigerator drum, and forcing it up a chimney to the top of the refrigerator box. Here the cold air is free to fall by gravity, or is sucked down by the fan through the box, absorbing the heat from the various meats and groceries placed therein. The particular advantage of this arrangement is that the air in the box is kept perfectly dry; for the moisture is condensed on the drum and drips into a tank of brine below, whence it may be tapped off when desired.

The Electrical Show at Madison Square Garden.

Fifty years ago the first cable message was flashed across the Atlantic. Twenty-five years ago the first bill for electric current metered in New York city was collected by the original Edison Company. These two events are commemorated in the Electrical Show now running at Madison Square Garden; and in honor of the occasion, Thomas A. Edison, who started the first electrical plant in New York at Pearl Street, generating current for four hundred 16-candle power lamps, has been elected president of this exhibition. In honor of the fiftieth anniversary of the submarine cable, a collection of oil paintings, water colors, electrotypes of gold medals, specimens of the original Atlantic cable, and various devices illustrating the method of laying the cable, has been loaned by the Metropolitan Museum of Art.

The features which attract the greatest popular interest are the incubator, cow milker, and the vacuum horse groomer. The incubator, which is heated electrically, contains eggs that are about ready to hatch, and a large number of chicks have made their entrance into the world before the very eyes of the spectators. The cow milker is exhibited on the floor below, where several patient cows are stalled. At milking time vacuum milkers are attached to the cows, and operated electrically. The horse groomer, which is also on this floor, is similar to a vacuum cleaner, the suction being produced by electric power.

The progress of wireless telegraphy is exemplified by the news bulletins which are published from time to time, the news being received by wireless telegraphy from the Times Building, set up on a linotype machine, and printed before the spectators. The efficiency of this system was illustrated by the printing of the score by innings of the recent New York-Chicago baseball game.

As in previous years, the Brooklyn Edison Company deserves special credit for its display. This year it has three sections, illustrating domestic, commercial, and industrial uses of electricity. The domestic appliances, particularly labor-saving devices for use in the kitchen, are very popular. The commercial section consists of a complete "gents' furnishing store," and shows the best method of lighting the store. The New York Edison Company, in commemoration of its twenty-fifth anniversary, occupies a large section of the floor in the form of tearooms, which are most artistically decorated and lighted. The rooms are fitted with electrical appliances of every sort for use in the household.

In one part of the building an underground manhole in section shows the form of these large rooms under the sidewalk, where cables, telephone wires and the like are connected and spliced. The use of the photometer for measuring the total spherical candlepower of arc lamps and incandescent lamps makes a prominent part of the show. One of the tests shows how the efficiency of insulators for high-tension lines is determined. The insulators are subjected to a current under tension of 250,000 volts, in an artificial rainstorm. The play of lights around the insulators makes a beautiful and attractive exhibition, even for those who do not appreciate the value of the test.

Among the other exhibitions may be mentioned a new rectifier for alternating currents, in which no inductance, resistance, electrolyte, or vacuum tube is used. The current is mechanically transformed into an intermittent direct current, and may be used for charging batteries of one cell, or any number within the limits of the line voltage. A new method of repairing iron trolley poles is illustrated in one of the booths. It consists of a bundle of rods, which are lowered into the pole after the top cap has been removed. These rods are lodged in the pole at the proper depth to extend three feet above and below the ground surface. At the upper end the rods spread out like ribs of a partly opened umbrella. Concrete is pumped into the pole until it covers the top of the rods. When the concrete sets, it renders the pole even stronger than in its original condition. Even if the iron should rust through, completely separating the upper part of the pole from the ground section, the reinforced concrete core would be more than able to stand all the strains that are imposed upon the pole.

The usual variety of domestic appliances are shown in great numbers, and the vacuum cleaner, of which there are several varieties exhibited, forms a prominent part of the exhibition. Altogether, the Electrical Show this year is well worth seeing, and an improvement upon last year's exhibition.

Wilbur Wright Fulfills the Conditions of His Contract with the French Syndicate.

After winning the $1,000 prize offered by the Aviation Committee of the Aero Club of France for the longest flight up to October 1, by his flight of 48.1 kilometers (30 miles), recorded in our last issue, Mr. Wilbur Wright set out to fulfill the conditions of his contract with the French syndicate headed by M. Weiller, which required him to make two 50-kilometer (31-mile) flights carrying a passenger, within a week's time.

After spending several days overhauling and testing his motor, which had been giving some trouble through loss of lubricating oil, and also after fitting a pair of new propellers which were larger and of slightly greater pitch, Mr. Wright on October 3 again resumed his experiments. After testing the new propellers in the morning in three short flights of 4 minutes 51 seconds, 9 minutes 31 seconds, and several minutes respectively, and again in the afternoon in a longer flight of 18 minutes 24 seconds, Mr. Wright took George B. Dickin, Paris correspondent of the New York Herald, as a passenger on a 3-minute 21-second flight. His description of the sensations he felt is interesting. In starting, the sudden rush forward was much like the sudden drop on a water toboggan, or roller coaster, but once the machine was soaring, he felt perfectly secure, and found the swift motion through the air much more pleasurable than when in an automobile, as it was unaccompanied by any shock or jar, though the noise of the unmuffled motor beside him was almost deafening. The higher the machine flew, the slower it seemed to be traveling; while when it was near the ground, the sensation was much like that experienced in an automobile. There was no shock in alighting. The two strongest impressions received by this passenger were the apparently increased size of the aeroplane while in flight and the very great security and stability in making the turns.

At dusk the same evening (October 3) Mr. Wright, with Franz Reichel of the Figaro as passenger, made a record flight of 55 minutes 37 seconds, during which he traversed a distance of fully 58 kilometers (36 miles). It was shortly before 7 P. M., and dark save for the moonlight, when the flight terminated. In making it Wilbur Wright fulfilled the first half of his contract. His previous longest flight with a passenger was 11 minutes and 35 seconds. According to calculations made by Aero Club officials, the aeroplane in its morning flights attained a speed of over 74 kilometers (45.95 miles) an hour with the wind and 54 kilometers (33.53 miles) an hour against it, while in the afternoon the average speed was figured to be 61 kilometers (37.88 miles) an hour.

On Monday, October 5, Mr. Wright tested the weight-carrying properties of his aeroplane by making three flights with heavier men as passengers than he had taken up before. First he took M. Leon Bollee, who weighs 238 pounds, on a 4-minute flight, and afterward M. René Peller, whose weight is 194 pounds, on a 2¾-minute and a 7½-minute flight respectively. No trouble was experienced in rising in the air, and the flights were made with great steadiness.

The next day, October 6, Mr. Wright made the second long-distance flight with a passenger, and thereby fulfilled the conditions of his contract. This time, with Mr. Arnold Fordyce as passenger, he remained aloft 1 hour, 4 minutes and 26 seconds. The average height during the flight is given as about 72 feet, and the distance covered slightly over 40 miles, which shows the machine to be quite capable of fulfilling the conditions laid down by our own War Department.

After having successfully fulfilled the conditions required of him before the purchase of his French patents for $100,000, Mr. Wright, during the next few days, took up numerous passengers on short flights of from 2 to 4 minutes' duration. On October 7, after first making a 3-minute 24-second flight with Mrs. Hart O. Berg, he took Mrs. Berg on a short flight of 2 minutes and 3 seconds duration. Mrs. Berg was the first woman to fly in a Wright aeroplane, and so delighted was she with the experience that she induced Mme. Bollé to make a flight the next day. On October 7 Mr. Wright also took up Michalo Pulo, an 11-year-old boy, in one of his flights. Among those who went with him on this and the following day were M. Paul Jamin; M. Soldatenkoff, an *attaché* of the Russian embassy at Rome; Sargeant Kasnakoff, Messrs. Butler, Brewer, and Rolls, Major Baden-Powell of England, and Commandant Bouttieaux of the French Aeronautic Corps. With the latter officer Mr. Wright attained a height of about 75 feet. Among the spectators was Queen Margherita of Italy.

So enthused have the French people become over Mr. Wright and his performances, that a public subscription for a testimonial to him has been opened at Le Mans. The gold medal of the Governing Committee of the Aero Club of France has also been awarded to him.

Manufacture and Uses of Levulose or Fruit Sugar.

Levulose, or fruit sugar, is little known to the general public. It is sold only by druggists and the cost of manufacturing it by the methods now in use is so great that the price of levulose is nearly a dollar a pound. This variety of sugar possesses properties which would bring it into extensive use if its cost were not prohibitive.

The only process by which chemically pure levulose can be produced cheaply in large quantities is based on the employment of inulin as the raw material. Inulin is a variety of starch which is found, in proportions of 8 to 11 per cent, in the roots of chicory and the tubers of the dahlia. The dahlia is a native of America and was introduced into England in 1789 and into Germany in 1812. It was supposed that the tubers would be a valuable food for cattle, but the cattle refused to eat them, and therefore the dahlia has been cultivated for its flowers alone. Yet dahlias could be raised as easily and almost as cheaply as potatoes. They are propagated by division of the tubers which, with special culture, may attain a weight of more than a pound. Chicory root is well known and is raised in immense quantities in Germany, Austria, France and Belgium for the purpose of mixing with coffee.

The manufacture of pure levulose from chicory or dahlia tubers is very simple. In the first place the inulin is extracted from the tubers by boiling them with lime water. The inulin is then converted into levulose by the action of dilute acids.

The field of application of levulose is very extensive. Levulose is sweeter than ordinary sugar and it possesses other advantages over the latter. In particular, it can be eaten with impunity and completely assimilated by the majority of diabetic patients. It is also recommended in acidity of the stomach and in recent years several eminent physicians have advocated its use as a food for consumptives. It may also be substituted for milk sugar in the preparation of infants' foods. In the manufacture of bonbons, jellies, marmalades and fruit preserves it possesses the advantage of neither crystallizing nor becoming turbid, and from it can be made an imitative honey which does not solidify and which is almost identical with natural honey, of which levulose is the principal ingredient. In the preparation of beer, wines and non-alcoholic beverages levulose will also be found very useful. From inulin an excellent bread for diabetics can be made.—Umschau.

The Cost of a Panama Hat.

Panama hats are made in Colombia, Peru, and Ecuador, but never in Panama. The value of a Panama hat is chiefly the cost of the labor expended in making it, for the value of raw material never exceeds 35 cents, and averages less than 13 cents. The labor is exceedingly cheap, but a great deal of it goes to the making of a hat. It takes a man, working six hours a day, six or seven days to make a common hat, worth a dollar. Two weeks are required to make a hat of better grade, worth from $1.25 to $3.00, and six weeks to make a fine hat, worth $20.

In making a fine Panama hat the straw is never dampened, and consequently the work can be done only when the air is very moist, that is to say, early in the morning, and in the evening. The straw used for cheap hats is kept wet, so that the work can be carried on during a greater number of hours per day.

Second Contest for the Scientific American Heavier-than-Air Trophy.

It is announced that the next contest for the Scientific American heavier-than-air or aeroplane trophy is to be held at Morris Park, Bronx Borough, in this city, on November 3, under conditions much more severe than those of the first contest at Hammondsport, N. Y., in July last.

The experiment on the elevated railway lines in Chicago to eliminate noise by the use of a gravel roadbed on the structure, has recently been abandoned, as the gravel not only failed to reduce the noise, but held water, with injurious effects to the structure.