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[Written and Illustrated Expressly for ICE AND REFRIGERATION.]

A Modern Closed Type Ice Making Plant.

A DISTILLED-WATER ICE MANUFACTURING PLANT BUILT ALL ON ONE FLOOR—DESCRIPTION OF PLANT OF THE PEOPLES' PURE ICE CO., CHICAGO—DISTILLED WATER OUTFIT—COURSE OF THE EXHAUST STEAM—FREEZING TANKS—ICE STORAGE ROOMS—STABLES—DIAGRAMS AND VIEWS.

SOME exterior and interior views are herewith presented of a plant that is claimed to be the first ice making plant on the distilled water, can system, ever erected all on one floor and the first plant in the United States or in any country so far as known built entirely on what is termed the "closed system" throughout. Nowhere within the buildings or about the plant is any escaping steam visible or is any water to be seen. All the machinery and apparatus, steam condensers, ammonia condensers, reboiler, water filters, etc., are all enclosed

accomplished is known as the ice factory of the Peoples Pure Ice Co., Chicago, which was erected in 1901. It is located at No. 34 Clybourn place, in the northwestern portion of the city, near by the north branch of the Chicago River and along the tracks of the Chicago, Milwaukee & St. Paul railroad. There are four buildings, as may be seen in the illustrations, all one story in height, except the stables, which have a loft for storage of feed, etc. The main factory building, consisting of engine room, condenser room, tank room and ice sales room, is



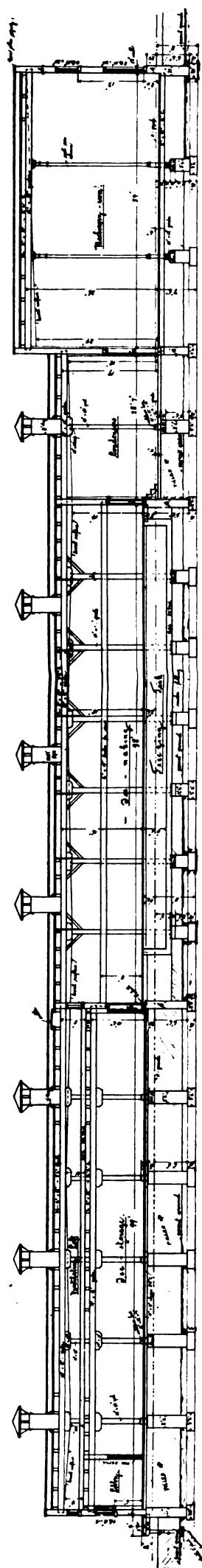
GENERAL VIEW OF THE PLANT OF THE PEOPLES' PURE ICE CO., CHICAGO, FROM COR. CLYBOURN AVE. AND CLYBOURN PLACE.

and the steam passes in a continuous course, absolutely unexposed, from the boilers to the cans in freezing tank. No water is wasted except the river water that is pumped through the double-pipe condensers to cool the ammonia or the exhaust steam and passes thence to the sewer. All possible drip from exhaust steam line, all drip water from traps or heaters and all purge water from vacuum pumps is collected and pumped back into the distilling system.

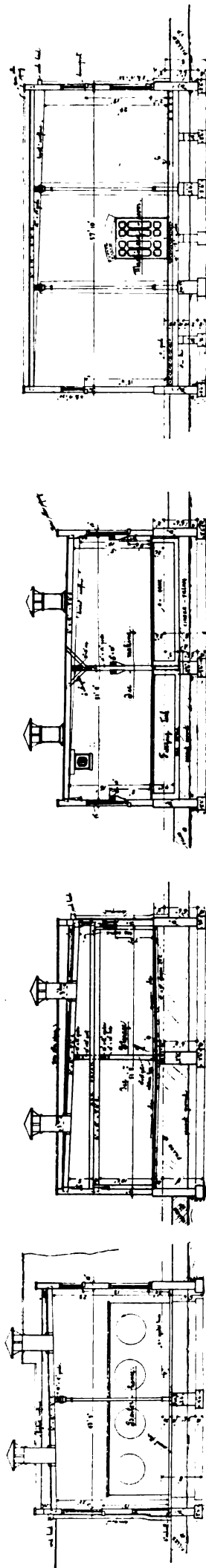
The model plant where all this is being satisfactorily

321 feet in length and 124 feet in width, built with brick walls and composition roof. Directly adjoining are the ice storage houses, which are 110 feet in length, 50 feet wide at one end and 69 feet wide at the other end, built of frame, covered with corrugated iron. Fronting on Clybourn place is the office building, about 38 x 40 feet in size, built of brick. Between this and the main factory building is the wagon yard, with loading docks, 90 x 124 feet in area, with entrance between the office and stables.

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LONGITUDINAL ELEVATION OF THE MAIN BUILDING FOR THE ICE MAKING PLANT, INCLUDING ICE STORAGE HOUSE NO. 1, OF THE PEOPLES' PURE ICE CO., CHICAGO.



CROSS SECTION OF BOILER HOUSE.

CROSS SECTION OF ICE STORAGE HOUSE NO. 1.

CROSS SECTION OF FREEZING ROOM.

CROSS SECTION OF MACHINERY ROOM.

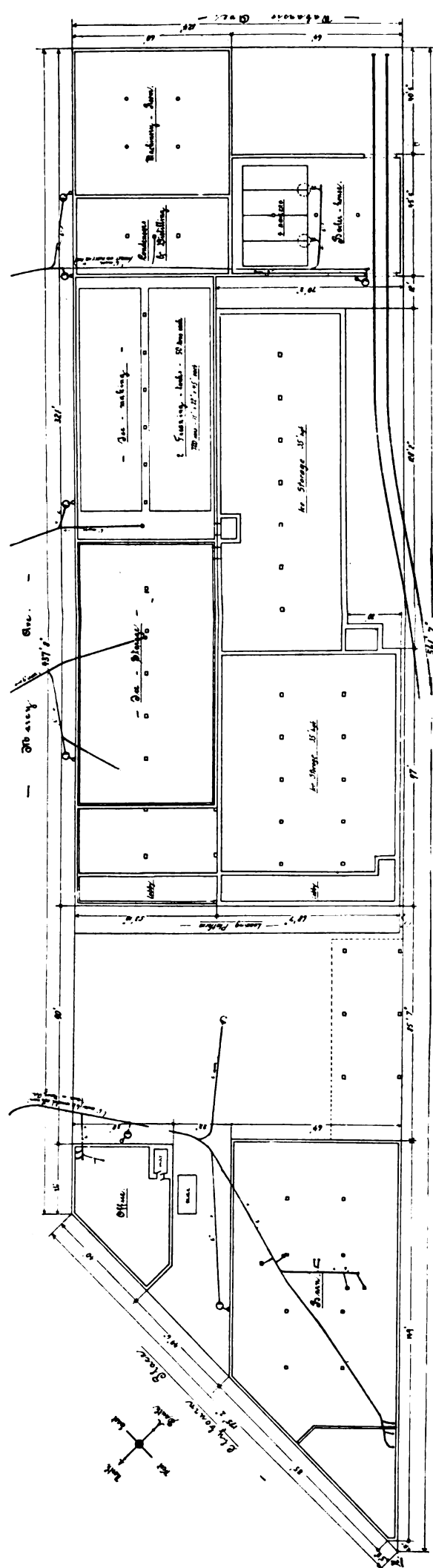


DIAGRAM OF GROUND PLAN SHOWING RELATIVE LOCATION OF THE DIFFERENT ROOMS IN THE ICE MAKING AND STORING PLANT OF THE PEOPLES' PURE ICE CO., CHICAGO.

The brick building for the stables is about 64 x 125 feet in size, and contains sixty single stalls and three box stalls, with a flat in one corner to serve as a residence for the barn man who has charge of the stables during the night, and an office and harness room at the opposite corner. Four galvanized iron ventilator shafts, each four feet in diameter, extend up through the hayloft and roof. This hayloft is ten feet in height, extending the entire

making capacity, is used for cooling the three ice storage rooms.

All three machines are so connected that any one of them or any two or all three, as desired, may be used to take care of the entire refrigerating and freezing system, so that in case of accident to any one compressor it can be cut out and all the work done by the remaining one or ones.



VIEW FROM ENGINE ROOM END OF THE ICE MAKING PLANT OF THE PEOPLES' PURE ICE CO., CHICAGO.

area of the stables and contains bins for oats and feed, besides ample storage room for hay, etc. The company uses some fifty or fifty-five horses in its business and about thirty ice delivery wagons and trucks.

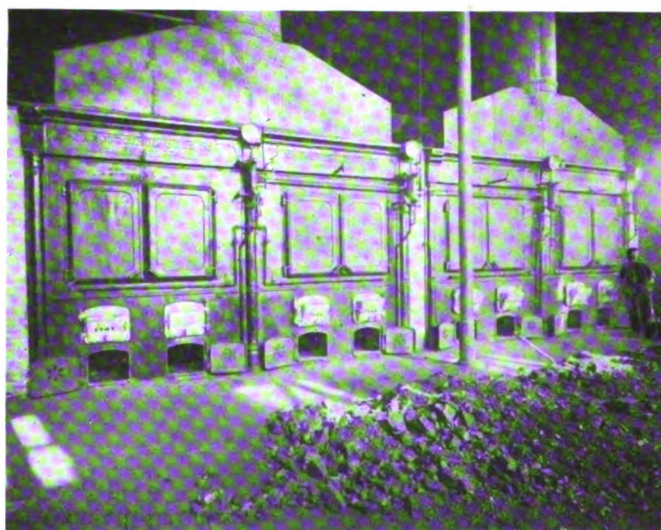
The buildings cover a plot 124 feet wide, 452 feet on one side and 560 feet on the other. Being a one-story plant, the walls are light and were much less expensive to erect than would have been the case for the ordinary ice factory built two or three stories in height. The light-wall one-story building was made possible by using the closed system, double-pipe condensers and vacuum re-boiler.

The ice making machinery and apparatus was furnished and installed by the York Manufacturing Co., York, Pa. The engine room, two views in which are shown, contains on one side three York ammonia compression machines. Two of these have 16½ x 28-inch single-acting vertical compressors direct connected to 26 x 28-inch Corliss steam cylinders with crank shaft twelve inches in diameter, each shaft having two main bearings twelve inches in diameter by twenty-one inches in length. Each of these machines has a capacity of producing sixty tons of ice each twenty-four hours when provided with the proper tankage.

The third machine has two single-acting vertical compressors, each fourteen inches in diameter by twenty-one-inch stroke, direct connected to Corliss steam cylinder twenty inches in diameter by twenty-one-inch stroke. Crank shaft ten inches in diameter with two main bearings each ten inches in diameter by seventeen and one-half inches long. This machine, which is of thirty tons ice

The compressor rods are packed with Nos. 334 and 337 high-grade packing of the Garlock Packing Co.'s make, while the steam rods are packed with metallic packing. For the initial charge of ammonia in the system twenty-seven drums furnished by the Herf & Frerichs Chemical Co., St. Louis, Mo., were used in all, some sixteen drums being first admitted and the rest added from time to time until the full charge of twenty-seven drums was in the system.

On the opposite side of the engine room is located, to the left, in the foreground, as shown in the view, the electric light power plant, consisting of a 25-horsepower



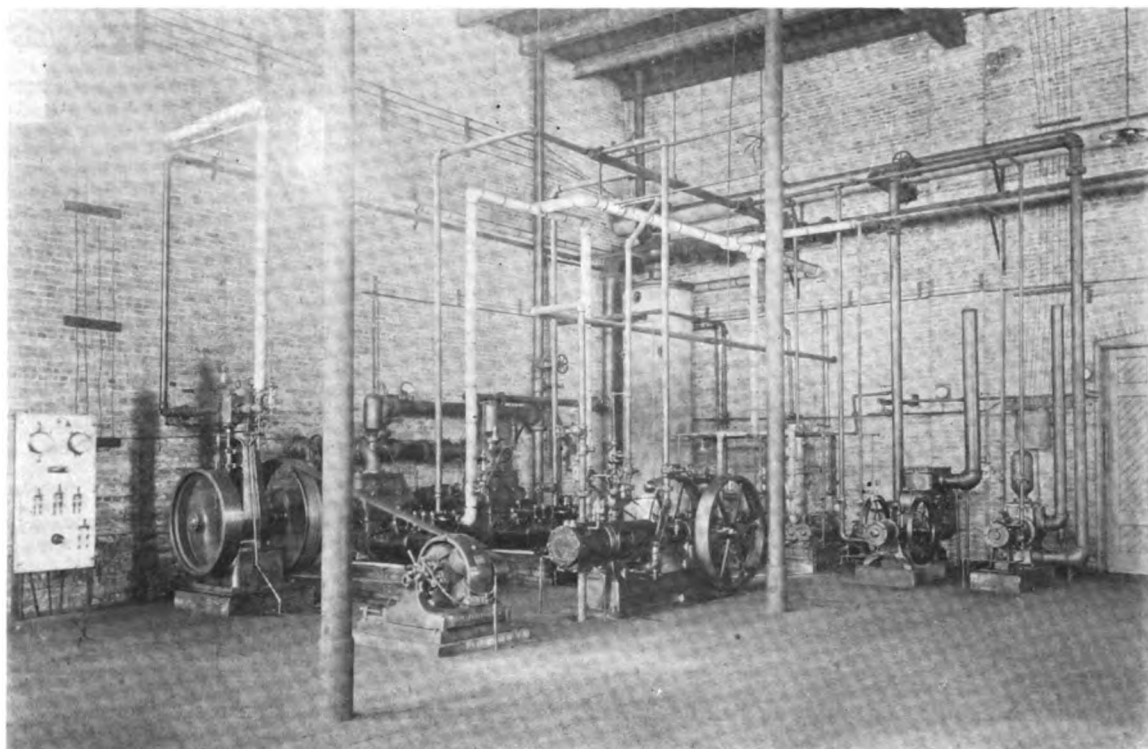
VIEW OF KROESCHELL BOILERS—PEOPLES' PURE ICE CO.

safety engine running at 280 revolutions per minute, belt-connected to a 12½-kilowatt, 120-volt dynamo. Attached to this by wires leading to the various houses, including offices, stables and ice storage rooms, are 200 incandescent lamps and one arc light. The same dynamo also furnishes power to run the link-belt reversible, endless chain ice elevator of 150 tons daily capacity in the ice storage house.

Immediately to the right of the dynamo is the Gardner air compressor, supplied by the Gardner Governor

joining the feed water tank and fitted with a skimming device and is there skimmed and returned to the distilled water system. Located against the rear wall, alongside the series of pumps mentioned, is the Kroeschell Bros. feed water heater, about three and one-half feet in diameter and fifteen feet high.

Near by and just visible between the vertical pipes in the second engine room view is the Cochrane oil separator, furnished by the Harrison Safety Boiler Works, Philadel-



ELECTRIC PLANT, AIR COMPRESSORS, PUMPS, ETC., IN ENGINE ROOM - PEOPLES' PURE ICE CO.

Co., Quincy, Ill., which furnishes compressed air for operating the ice hoists in tank room and the blast for cleaning out the ammonia and steam condensers and fore cooler. The air compressor has a 10 x 10-inch cylinder with 12-inch stroke.

To the right of the air compressor are the two 10 x 10¼ x 10-inch Worthington duplex cross-connected pumps for drawing the cooling water from the North Branch of the Chicago River. The pumps have 7-inch discharge and 10-inch suction pipe, either pump being of sufficient capacity to supply the water needed in the condensers. The water in winter time runs at about 37° F. but in summer rises to 78° F. and occasionally somewhat higher.

Alongside the cooling water pumps are the two vacuum pumps used for maintaining a vacuum of 22 to 25 inches on the reboiler. One of them is a Marsh pump with 8 x 10-inch cylinder and twelve-inch stroke; the other a Laidlaw-Dunn-Gordon, 8 x 12 x 10-inch stroke of the crank and balance wheel type. They are in duplicate, either one being of sufficient power to do all the work required.

Back of these are two small Worthington boiler feed pumps, each 6x4 by six-inch stroke, also in duplicate, and in addition there is a small "Gardner" pump, 4½x3 by four-inch stroke, which serves to collect all drip water from traps and purge water from vacuum pumps; in short, picks up all the usual wastage, which is discharged into a small galvanized iron can or box, set in the floor ad-

phia, Pa., which is ten inches in diameter and is located in the exhaust line just before it reaches the feed water heater.

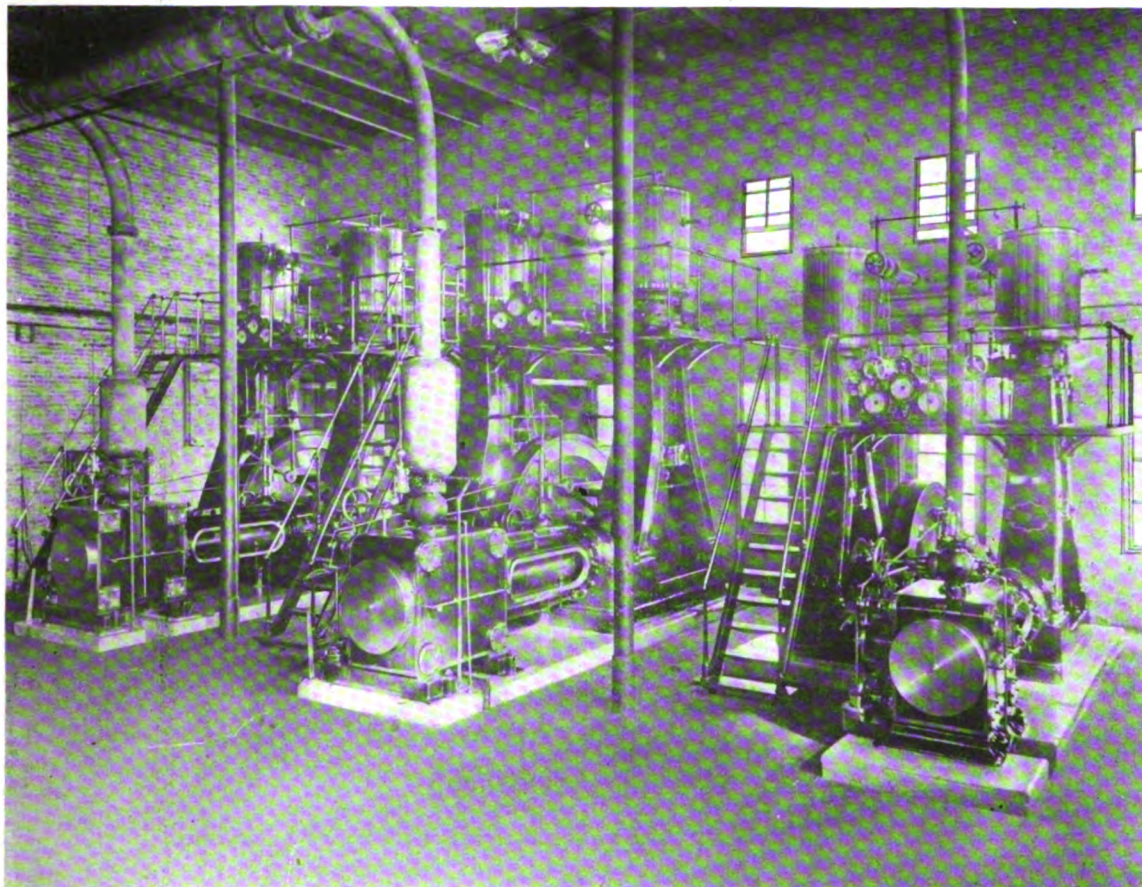
Immediately adjoining the engine room is the spacious boiler room, where are located four 72x18 feet return tubular boilers, installed by Kroeschell Bros., Chicago. Each boiler, rated as 150 H. P., has seventy 4-inch tubes,



W. J. MILES, CHIEF ENGINEER.

and each is fitted with herring-bone or V grates, and is hand fired, using ordinary slack coal. Two boilers lead into one stack, there being two stacks or chimneys, 44 inches in diameter by 65 feet high. Three of the boilers only are required to run the plant, the fourth being kept in reserve for emergencies. The boiler room extends in width beyond the other portion of the main building so that coal cars are run directly through the big doors into the boiler room, and each are dumped upon the concrete

in size and eighteen feet high in the clear. On one side are the ammonia condensers which consist of twenty-one stands of the Westerlin & Campbell double-pipe type, arranged in three sets, each set of seven sections, twelve pipes high and about seventeen feet long. The outer pipe is two and the inner one and a quarter inches in size. The temperature of the water running off the condensers in cold weather is about 60°, but in summer time runs up as high as 90° to 95°. Immediately below the condensers is



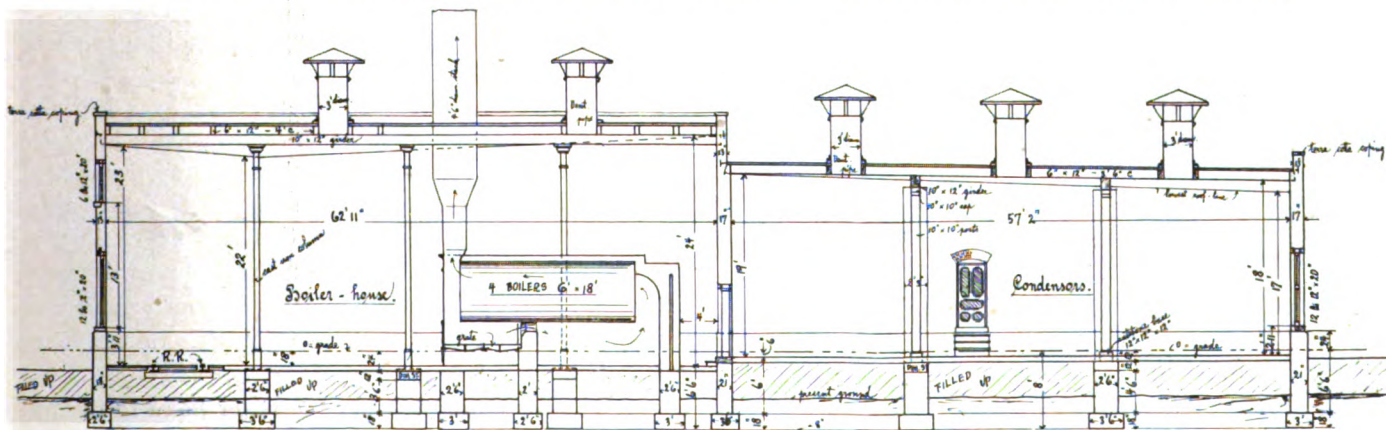
VIEW OF THE THREE "YORK" ICE MAKING MACHINES PEOPLES' PURE ICE CO., CHICAGO.

floor directly in front of the boilers, saving thus much extra labor in handling the coal.

Just off the boiler room is a complete repair shop with forge, lathe and complete apparatus for turning a rod or shaft, re boring a cylinder, threading a screw or making the numerous minor repairs required from time to time in every power plant or where complicated machinery is used.

Passing now from the engineroom into the condenser-room or distilling room adjoining, views in which are shown herewith, we enter a rectangular room, 60x29 feet

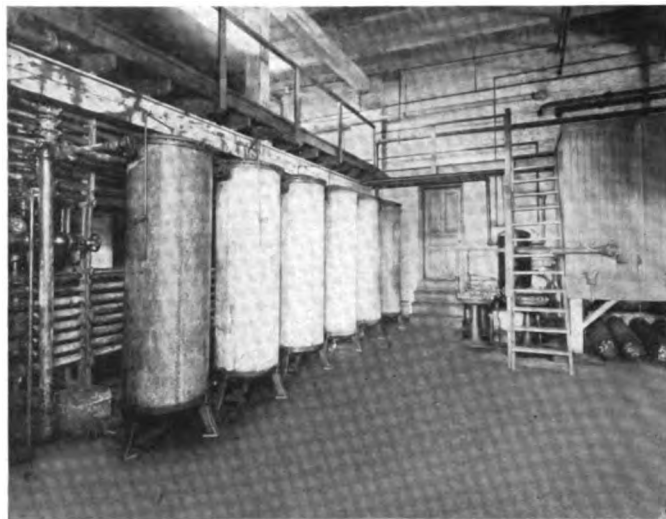
a W. & C. double-pipe ammonia cooler, eight pipes wide, each pipe three inches in diameter outside, with two-inch inner pipe. All the liquid ammonia coming down out of the condensers passes through this cooler, where it comes in contact with fresh cool water; however, it is so connected that the cooler may be shut off at any time and the ammonia sent direct from condensers to the ammonia receivers or to the expansion valve. Directly below the ammonia coolers are the two liquid ammonia receivers, each twenty inches in diameter by twelve feet long.



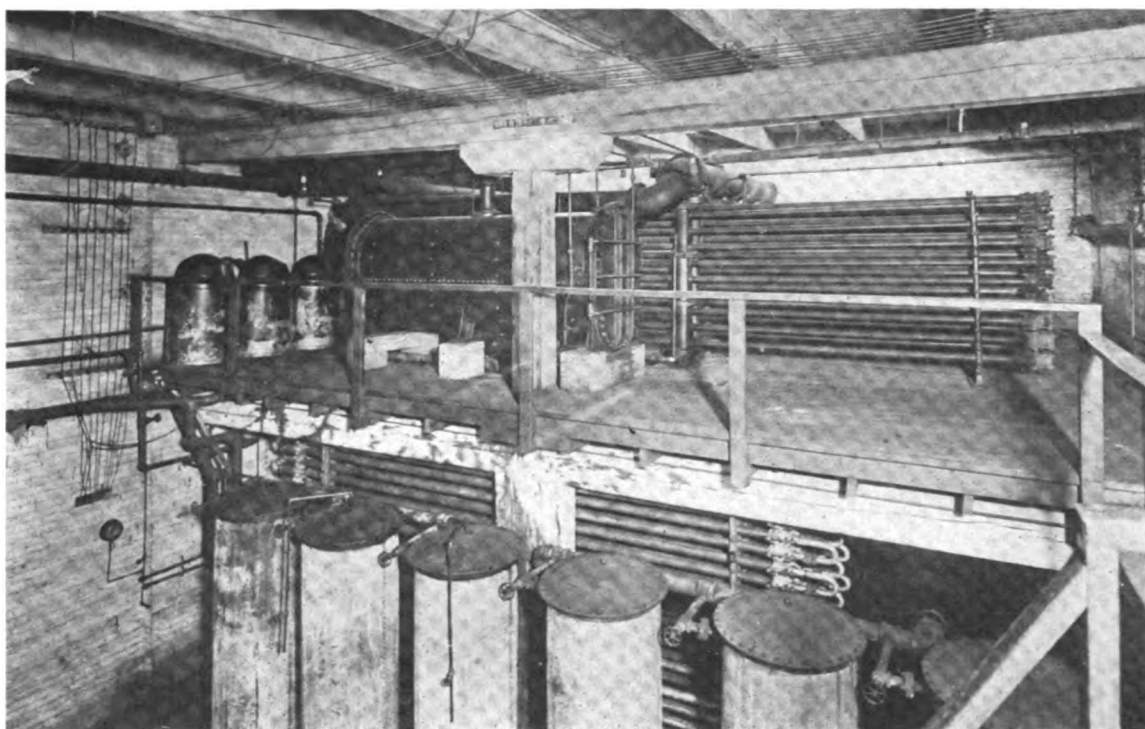
LONGITUDINAL SECTION THROUGH BOILER HOUSE AND CONDENSER ROOM PEOPLES' PURE ICE CO.

At opposite end of condenser room, upon a raised platform, are located the 100-ton steam condensers of the Westerlin & Campbell double-pipe type, arranged in five stands, ten pipes high, two pipes wide in each set and about twenty feet long. The pipes in the first set are $2\frac{1}{2}$ -inch outer pipe and $1\frac{1}{4}$ -inch inner pipe; the next sets are 2-inch outer and $1\frac{1}{4}$ -inch inner pipe, the pipes being about twenty feet long. All these double-pipe coolers are provided with steam connections for blowing them out, the ammonia pipes being also provided with connections from the air compressor so as to drive out all steam and liquid. A double-pipe cleaner, which is simply a metal-strip flue scraper at end of a wire cable, is used for cleaning out the steam condenser and cooler pipes.

The exhaust steam admitted to top of condensers is liquefied in its descent and flows to skimming tank, located just underneath, which is four feet in diameter and $5\frac{1}{2}$ feet high, shown in view. Close up to it is a small re-

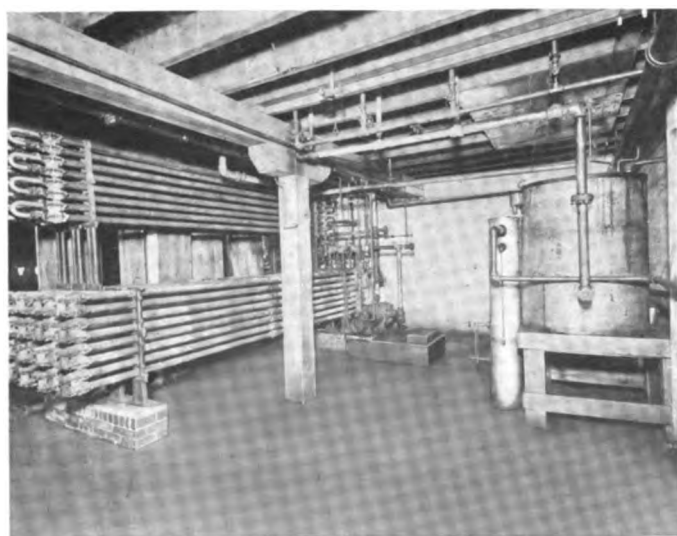


CHARCOAL FILTERS AND CORNER OF DISTILLED WATER TANK.



VIEW OF STEAM CONDENSERS AND REBOILER ON RAISED PLATFORM WITH COOLERS AND FILTERS BELOW.

skimming tank for skimming the skimmings, thus saving all the water.



DISTILLED WATER COOLERS, SKIMMING TANK AND PUMP.

From the skimming tank the water is drawn by vacuum created by the vacuum pumps in engine room, already described, up to the reboiler, which is located on the raised platform adjoining the steam condensers, as may be noted in the illustration. The reboiler is about $2\frac{1}{2}$ feet wide by $3\frac{1}{2}$ feet high and ten feet long. In the illustration are also shown three small tanks on the edge of the platform. These are merely the engineer's oil tanks placed there for convenience.

The water level in reboiler is controlled by a float near the bottom of the cylinder, which float controls the speed of the pump that pumps water out of the reboiler system. This pump, located between skimming tank and distilled water cooler, shown in the illustration, is a 6x5-inch cylinder with 8-inch stroke Marsh pump, and pumps the water from vacuum to pressure. The pump is run by steam, as are all the other pumps, but the exhaust is returned into the system, as before mentioned.

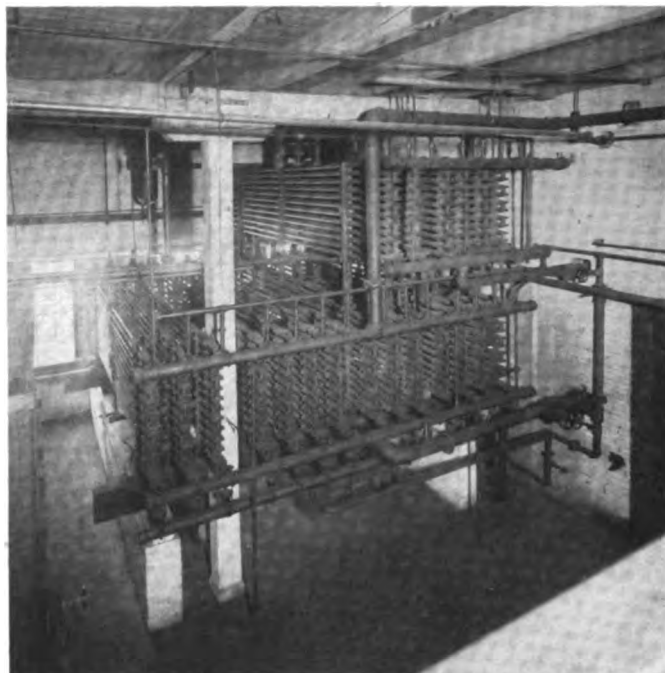
On the way from reboiler the water flows to the preliminary cooler, which consists of three sections of $1\frac{1}{4}$ -

inch inside with 2-inch outside double pipe, each section being eight pipes high and about eighteen feet long, before it passes to the pump mentioned, which puts it under pressure. It then goes through the forecooler, which consists of five sections of 2-inch and 1¼-inch double pipe, eight pipes high. The two coolers are plainly shown in accompanying view. The object of the preliminary cooler, as may be surmised, is to cool the water from reboiler sufficiently to be pumped through the remainder of the system.

From the forecooler the water is pumped up into the top of the first three of the six charcoal filters, which are shown in another illustration. Each of these filters is twenty-seven inches in diameter and seven feet high, filled with charcoal and crushed quartz. From the bottom of the first three filters it is forced into the top of the next three filters to complete the filtering process. By simply changing the connections the water may be passed directly through the six filters as desired.

From the filters the water passes to the distilled water storage tank, a part of which is visible at the right-hand side of the view showing the filters, and a corner of which may be seen to the left in the view of the ammonia condensers. The storage tank is eighteen feet long, six feet wide and six feet high, made of quarter-inch steel, and is insulated with an 8-inch layer of the Armstrong Cork Co.'s granulated cork, on each side of which is a double course of one-inch boards with two layers of F. W. Bird & Son's "Neponset" paper between. The tank contains 750 feet of 2-inch piping, through which the expanded gases from freezing tank coils flow on their way back to the compressors, cooling the water to about 40° F. or below.

From the storage tank the distilled water flows by gravity through the four International Filter Co.'s water



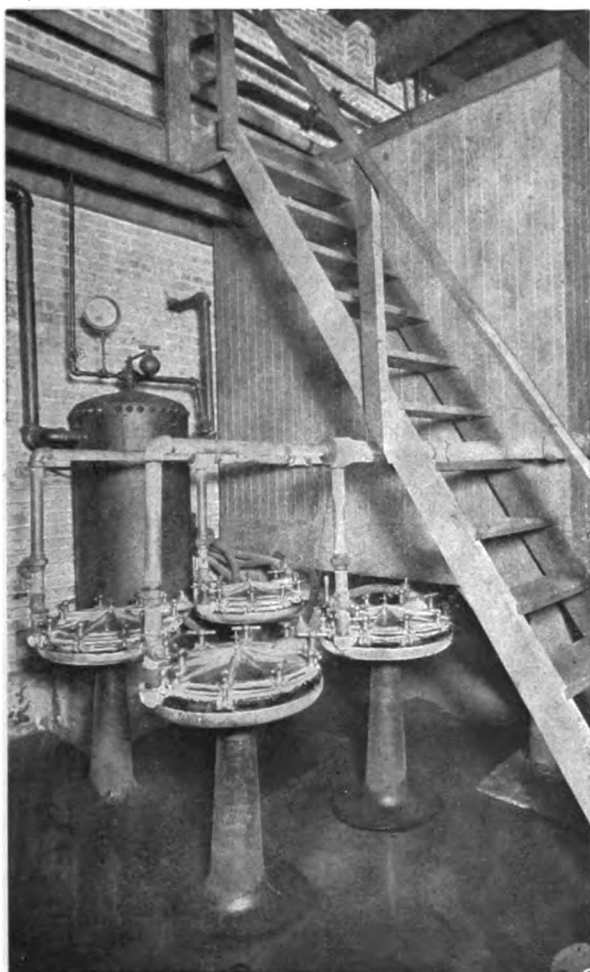
AMMONIA CONDENSERS—PEOPLES' PURE ICE CO., CHICAGO.

filters, which remove any possible impurities that might remain, and from them directly into the cans in freezing tank through the four James F. Burns can fillers. The small tank shown in the illustration, just back of the "International" filters, is a compressed air storage tank for the operation of the ice can hoists in tank room.

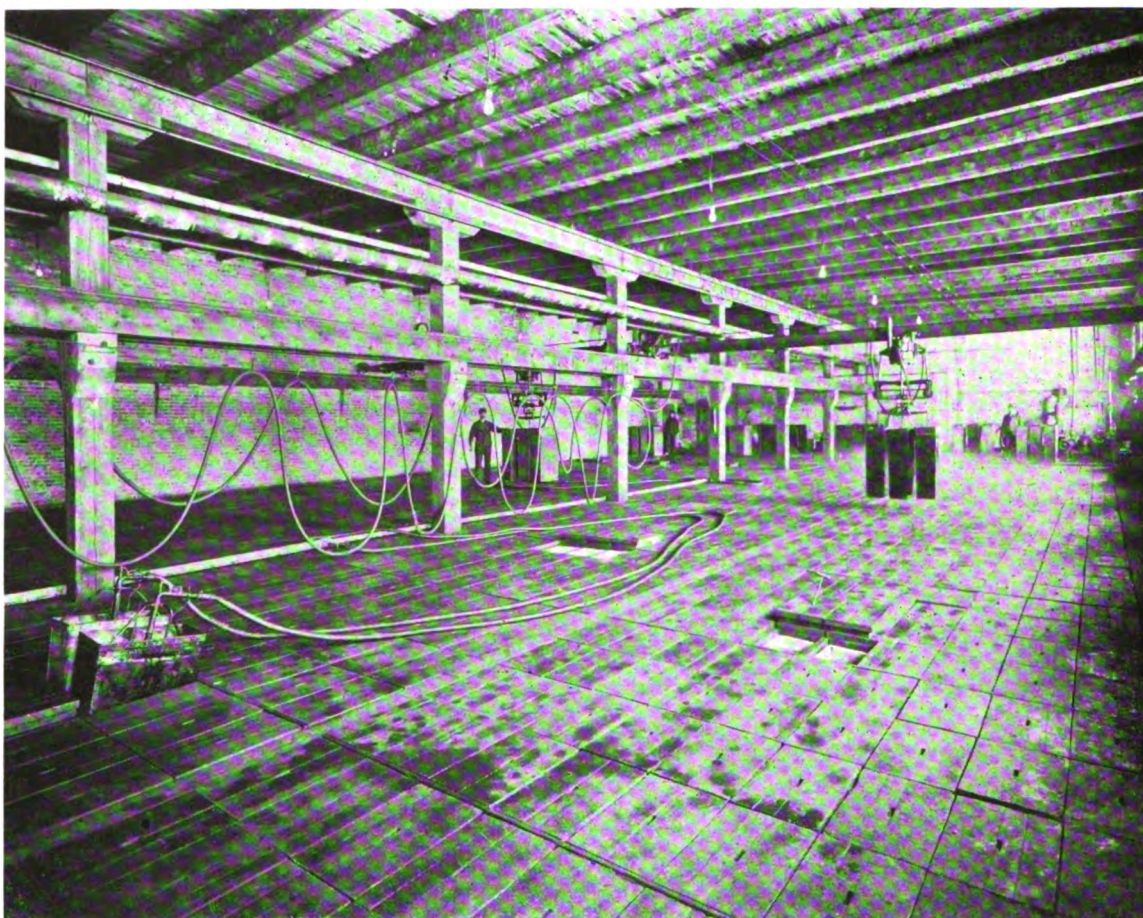
Directly adjoining the condenser room is the ice-tank room, which is 97x52 feet in size and sixteen feet high above the tank. Two views are shown, one an end view showing the expansion valves and manifold for the two tanks, and, just visible between, the small vertical engine which operates the propellers. There are two tanks, each twenty-three feet four inches wide and eighty-six feet nine inches long, made of quarter-inch steel, and each containing 720 300-pound ice cans. Each tank contains 16,000 lineal feet of 1¼-inch direct expansion piping, covered with chloride of sodium brine, agitated by rotary agitators, two for each tank. The temperature of the brine is kept at about 9° to 14° F., and the time of freezing is given by the engineer as about thirty-eight hours. The brine is made with the International Salt Co.'s "Retsof" salt. The calcium chloride was furnished by James H. Rhodes & Co.

On each tank there are ten ¾-inch expansion valves, each valve admitting the ammonia into two sections of pipe, while the return from all the coils are collected in one main header, four inches in diameter, which is directly connected to the coils in distilled water storage tank, through which it flows on the return to compressors.

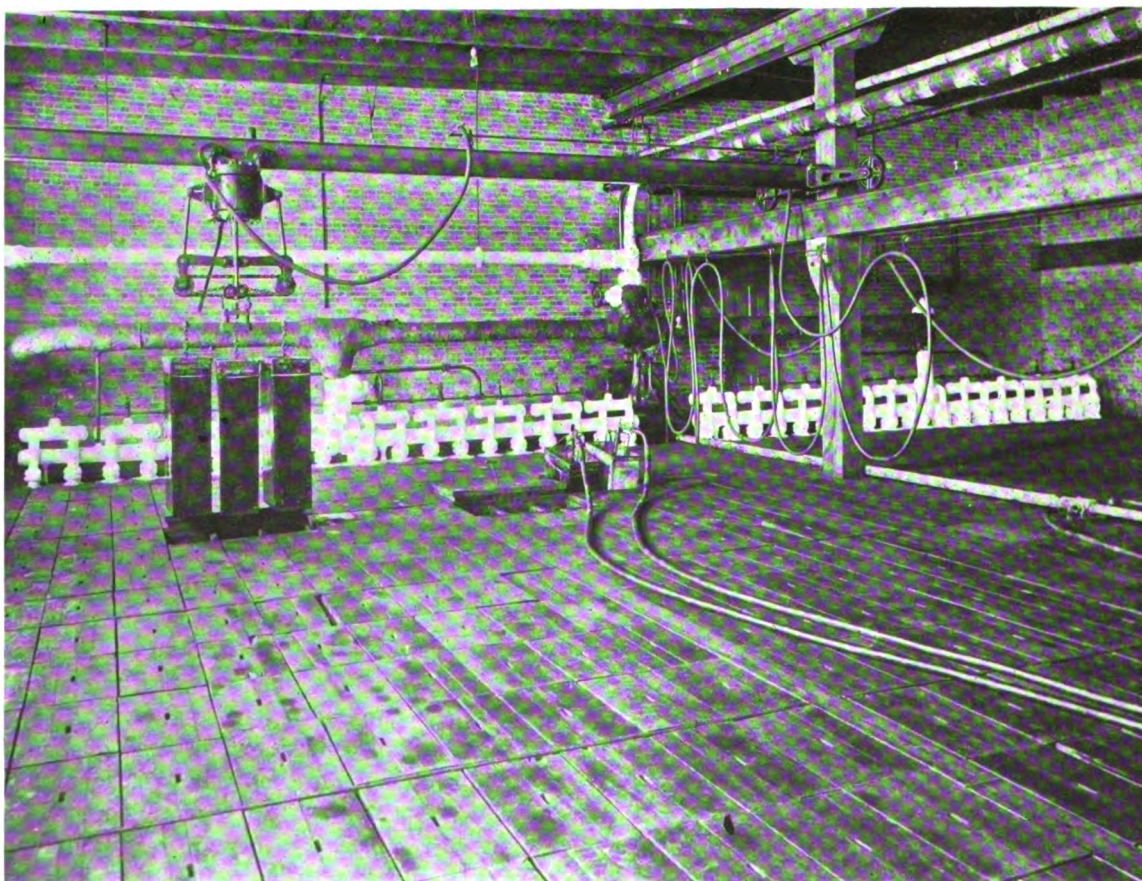
The ice is harvested by means of a compressed air pressure hoist, each hoist having a cross bar with chain connections to three ice cans, as may be seen in the accompanying views. The hoists run on an overhead traveling crane, provided with roller bearings and easily guided by hand, hung on perfectly level rails, which extend the entire length of the tank room. At end of room opposite to ammonia inlet are two hot wells, just large enough to admit three cans, into which they are lowered and left for about one minute, when they are readily dumped upon an ordinary inclined ice dump into the skids, from which they are slid either into the ice salesroom directly back of tankroom or into the ice storage houses directly alongside.



INTERNATIONAL FILTERS IN OPERATION—PEOPLES' PURE ICE CO.



VIEW IN ICE TANK ROOM, CAN FILLING AND HARVESTING OPERATIONS—PEOPLES' PURE ICE CO., CHICAGO.



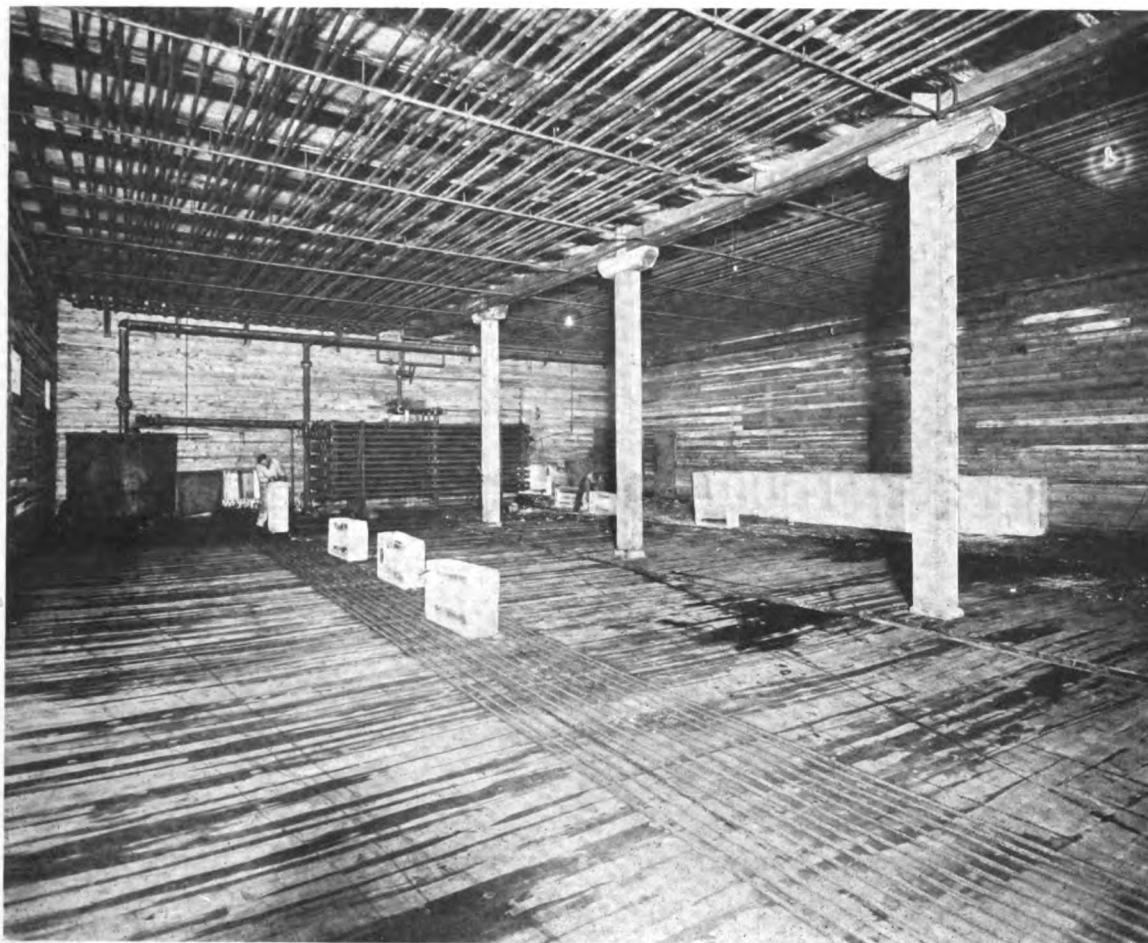
VIEW IN ICE TANK ROOM SHOWING AMMONIA CONNECTIONS, PNEUMATIC HOIST TRAVELING CRANE, ETC.

For insulation the ice tanks are placed upon a two-foot bed of cinders covered with a double layer of one-inch boards, with two thicknesses of F. W. Bird & Son's "Neponset" paper between. The ends and sides are protected with twelve inches of the Armstrong Cork Co.'s granulated cork, boards and "Neponset" paper.

Just visible in the longer view of ice-tank room at the extreme end to the right are the two pumps, one a "Gard-

age rooms. As already intimated, there are three such rooms, the one situated directly at end of tankroom being known as House No. 1, or salesroom. It is 120x53 feet in size, sixteen feet high, with storage room for about 2,500 tons of ice.

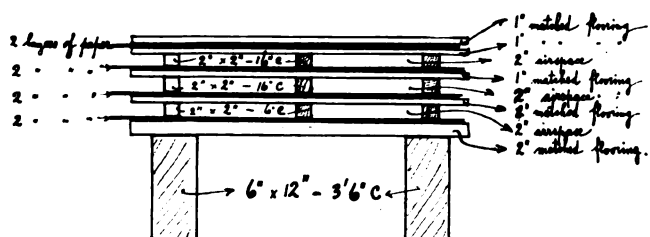
In this room, at the end next to ice-tank room, is the Westerlin & Campbell calcium chloride brine cooler, which consists of four sections of 3-inch outer and 2-inch inner



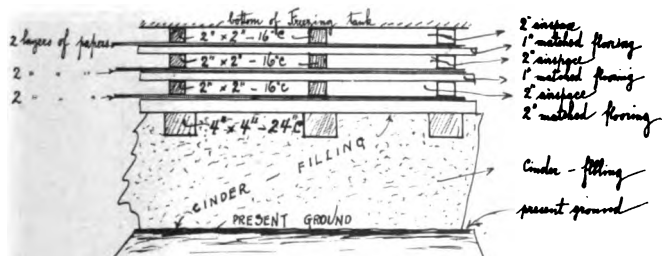
VIEW IN STORAGE HOUSE NO. 1 SHOWING BRINE COOLER, BRINE TANK, AND DOOR TO FREEZING ROOM.

ner," 8x8½-inch cylinder and ten-inch stroke, and the other a little more than half that size, used to circulate the calcium chloride brine through the piping in the ice stor-

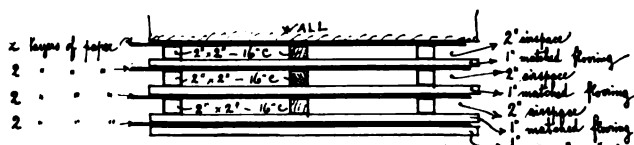
double piping, twelve pipes high and about eighteen feet long. Adjoining, against the wall, is the CaCl brine storage tank, six feet in diameter and five feet high, made of quarter-inch steel. This brine is pumped by means of the pumps in freezing tankroom, mentioned, through the network of 1¼-inch piping which covers the ceiling and the walls about three-quarters of the way down of the three ice storage houses, as may be seen in the accompanying views, reproduced from photographs.



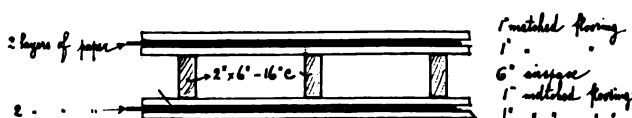
Detail of lined ceiling of Ice-Storage.



Detail of lining under Freezing-tank.



Detail for lining around walls of Ice-storage
and Freezing-tank.

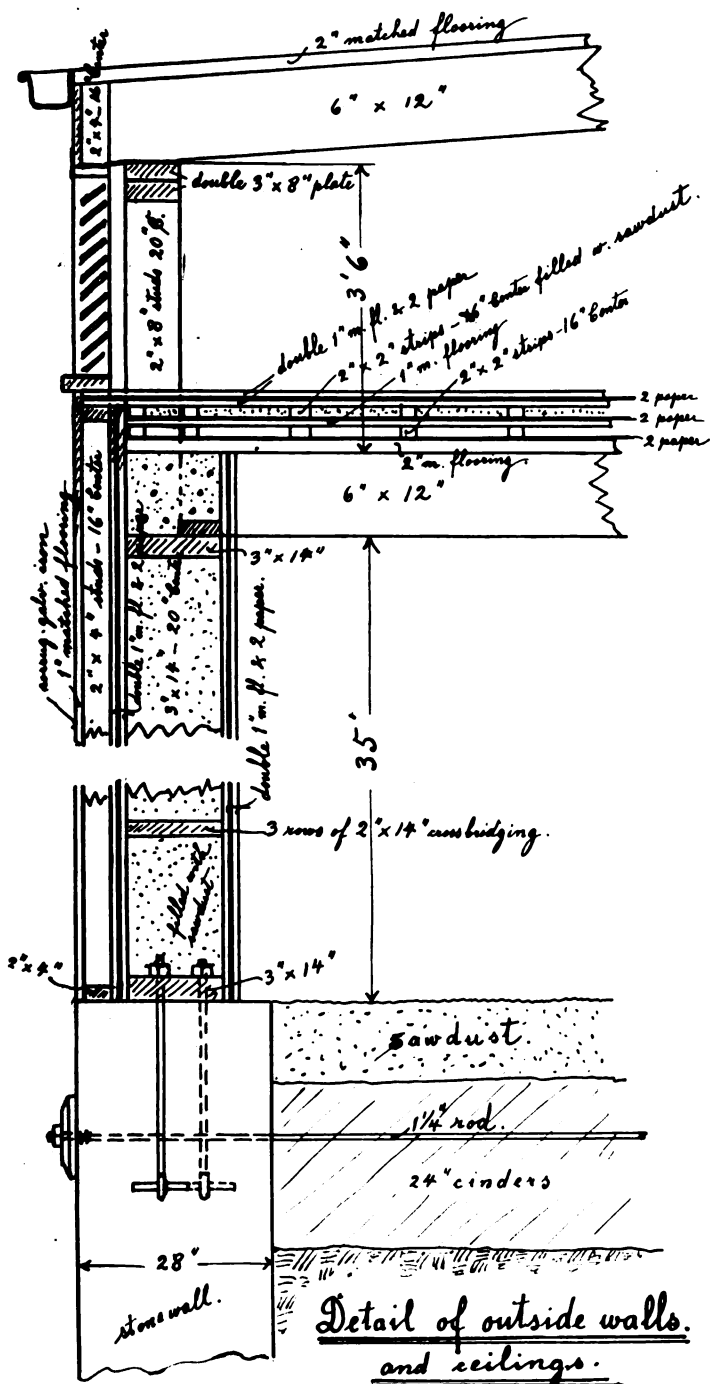


Detail of partition between Lobby & Ice-storage.

either direction. It is operated by power from the electric plant in engine room. There are also two ice-lowering platforms at opposite side of house, one each in houses No. 2 and No. 3, adjoining the doors through which ice is taken for loading cars. The lowering apparatus consists of a platform balanced by a counterweight, which is just a little heavier than platform and connected by a chain running over two sprocket wheels, with pulley and brake for regulating the speed in ascent or descent. The platform is intended for three cakes of ice or about 900 pounds, and, when loaded, descends by gravity, the empty platform

tion, in which the ice pulled during the night is stacked, and thus the necessity for opening the door of the main storage is avoided when the wagons need more ice during the day than the outer lobby holds.

The People's Pure Ice Co. was organized in 1901 and incorporated with \$500,000 capital stock. Albert Meyers is president and treasurer of the company and F. D. Ansley secretary. W. J. Miles is the chief engineer. The plans for the buildings, which were erected by the Falkenau Construction Co., were prepared by Architect Louis Lehle, Chicago. The company caters mainly to the domestic trade on the north side and in the downtown districts of the city and finds a ready market for the 120 to 135 tons of ice pulled from their freezing tanks, which were rated as of 100 tons daily capacity.



returning in a similar manner by the action of the counterweight. By this means, even when the houses are full, a 20-ton car can be loaded in from half to three-quarters of an hour.

A lobby ten feet wide, opening onto the loading platform, extends the entire wagon yard front of houses No. 1 and No. 3. The lobby is separated from the rest of the house by an insulated wall. For house No. 1, or saleshouse, there is an additional lobby or room twenty-four feet wide, separated from the main storage room by a single board par-