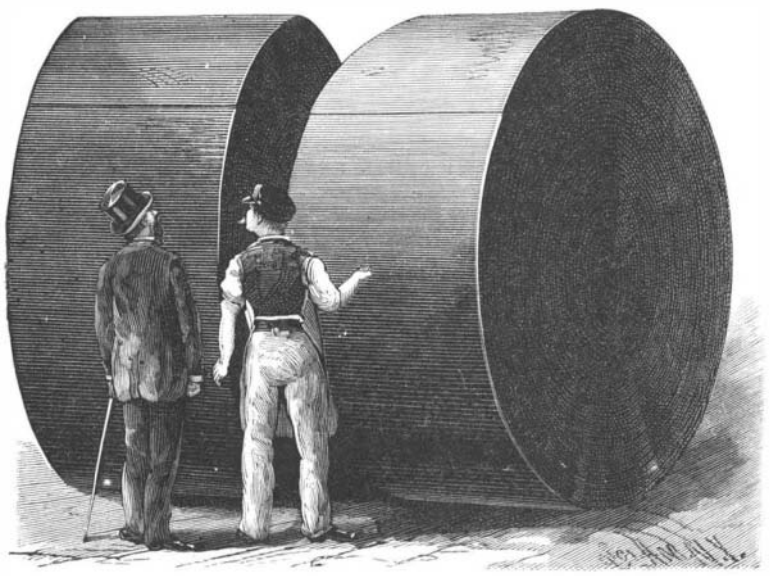
SPLENDID WORK DONE BY RUBBER BELTS.

The high standard of efficiency which can be realized by the employment of strictly first-class rubber belts is now receiving merited recognition from users who have had them in severe service for many years, and whose experience cannot fail to be of value to all mill owners and furnishers of factory equipments. In the matter of simple tensile strength, the superiority of these belts has long been conceded. In ordinary work, however, this consideration is practically of far less importance than that of having a belt which will hug the pulley tightly, or with which there will be no "slip." In this particular, whether the pulleys used be of the ordinary iron pattern or whether they be covered with leather, rubber, paper, or other material, the rubber belt has incontestably the advantage, as it will never slip under any service to which a belt of nearly suitable size for the power required can be subjected, whether the pulleys be covered or not. The slipping of belts is one of the most troublesome incidents in many shops, and it is not infrequent to find mechanics rubbing them with beeswax, resin, and other substances, to prevent slipping. This should never be done with any kind of belt; but where a rubber belt is used, the slipping, which affords a temptation to resort to such expedients, does not occur.

In the accompanying illustration we show two large belts of this kind recently completed by the New York Belting and Packing Company, each of them nearly half a mile long. These belts were sent to West Superior, Wis., and each of them weighed 11,000 pounds. Had they been made of leather, they would have required at least 500 selected hides to manufacture each one of them. At the same time the company also furnished a driving belt 52 inches wide, eight-ply, 298 feet long, and weighing 4,000 pounds.

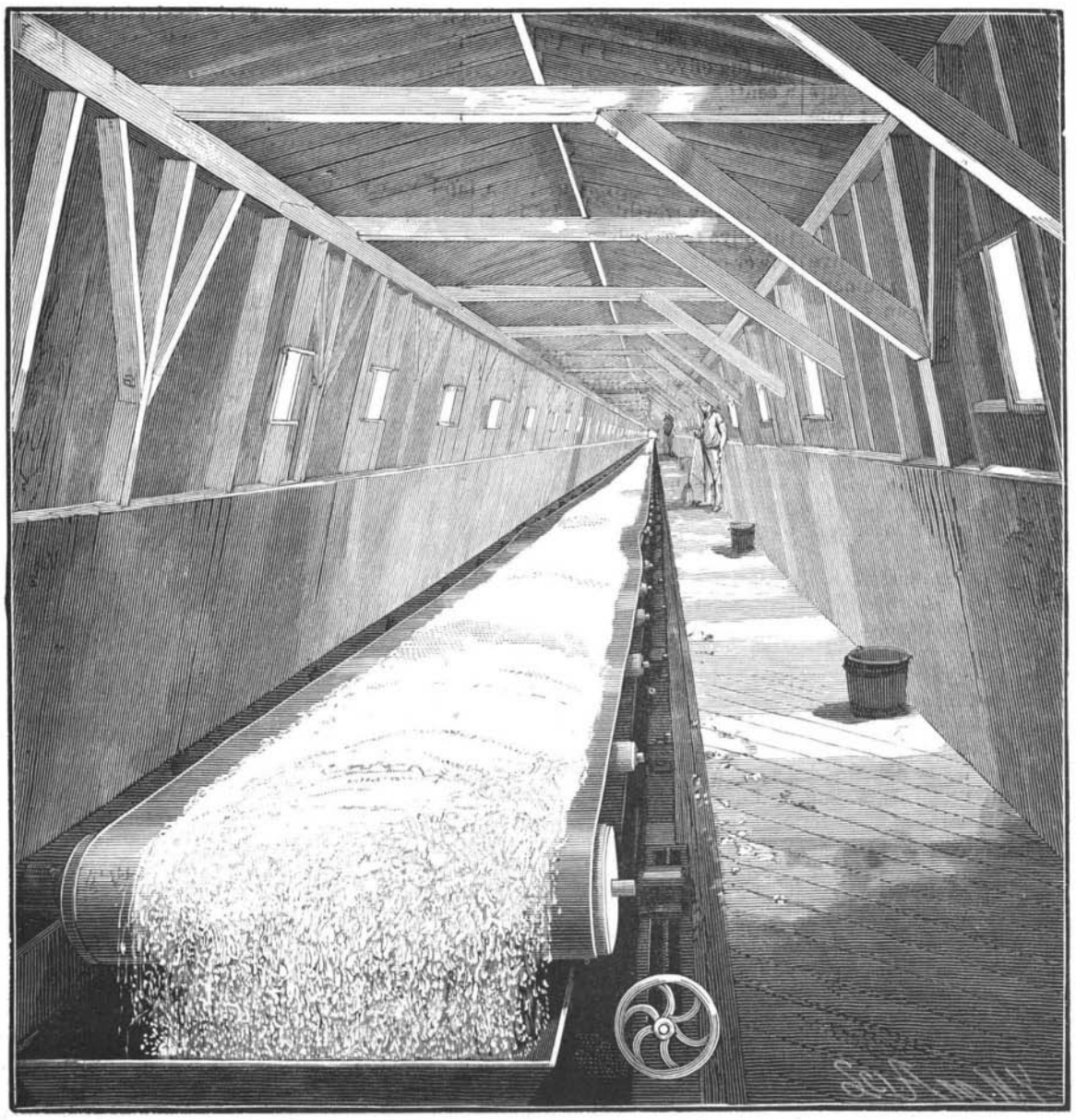


LARGE RUBBER BELTS.

In the larger picture may be seen a belt 2,700 feet long, recently made for the Pennsylvania Railroad Company, and in use in one of their grain elevators in Jersey City. This belt is used to convey grain from one end of the immense building to another, the grain being delivered upon the belt from another belt, and being taken off by a simple form of guide arm at any portion of its length, as well as at the end, and conducted into chutes for delivery to vessels at the dock. The belt runs on small rollers, and there is a simple form of tightener at the ends, by which it can be readily kept straight and even. In making conveyer belts of this description the company has long held a leading place, the superiority of such belts in point of economy, as well as of efficiency, being equally pronounced.

Perhaps the most important consideration of all to be taken into account in fitting up machinery is to have the plant so provided with power that there shall be no "breakdowns." Such mishaps necessitate the waiting of workmen in time they are paid for, as well as delay of the work, and involve an increased expense in the cost of production, which is seldom estimated at its true importance. In fact, there is no room allowed at all for such an item of cost with the close figuring practiced in many of our large industries at the present day, although it occurs with more or less frequency in every business. As touching this point, the company last year received a highly significant testimonial of the durability of one of their belts under heavy service. It was a main driving belt, 48 in. wide and 320 ft. long, six-ply, used in Central elevator "B," Chicago, and had been in constant service from September, 1869, until April, 1886, a period of sixteen years and seven months. The uninterrupted use for so long a period of so large and heavy a driving belt affords the best possible practical gauge of the character of its manufacture. The great tensile strength of rubber belting is due to its web of heavy cotton duck, the rubber being driven through and through its meshes by powerful machinery. The fabric used for this purpose is made expressly for the company by Brinckerhoff, Turner & Co., of New York, and has more than double the strength of the heavy cotton duck used for sails of ships. The preparation of the rubber itself is, however, a long and very elaborate process, in which the present manner of working has only been reached after years of experiment. The sulphur to be used in the vulcanizing is carefully tested and weighed, as are also the different metallic oxides, making a semi-metallic compound, which gives the surface of the belts a high degree of firmness, while there is yet sufficient elasticity to allow of their hugging the pulley closely, and enables them to resist a high degree of heat, so that their surfaces may not be injured by friction. The several thicknesses of rubber-impregnated duck which go to make the several weights of belts are so arranged, by the folding over of the outside strip, as to present a perfectly even and half round edge, and then passed between powerful heated rollers. Subsequent to this the large belts are finished in an immense steam press, said to be the largest of the kind in the world, and calculated to completely take the "stretch" out of the largest sized belt. The press will take a belt six feet wide and fifteen feet of its length, steam being let into its bed and platen so that the temperature can be readily regulated, and the pressure and heat applied while the belt is under the full tension of the heaviest strain it may be desired to put upon it, thus setting its fibers as compactly as they are formed in a steel spring. The company owns the patent for this stretcher, in combination with the press, as well as many other patents of great value in the business.

The principal factory of the company, and the oldest one engaged in the rubber business, is at Newtown, Conn., although they have another one at Passaic. The offices, salesroom, and warehouse are at No. 15 Park Row, New York City. John H. Cheever is the treasurer of the company and general manager of the business.



A BIG GRAIN ELEVATOR BELT MADE BY THE N. Y. BELTING AND PACKING CO.

Tyndall on Lightning Rods.

Professor Tyndall, in a letter on lightning conductors, points out that the abolition of resistance is absolutely necessary in connecting a lightning conductor with the earth, and this is done by closely embedding in the earth a plate of good conducting material and of large area. The largeness of area makes atonement for the imperfect conductivity of earth. The plate, in fact, constitutes a wide door through which the electricity passes freely into the earth, its disruptive and damaging effects being thereby avoided. A common way of dealing with lightning conductors adopted by ignorant practitioners is, Dr. Tyndall remarks, to carry the wire rope which forms part of the conductor down the wall and into the earth below, where it ends without any terminal plate. Such a "protection" is a mockery, a delusion, and a snare. Some years ago a rock lighthouse on the Irish coast was struck by lightning, when he found by the engineer's report that the lightning conductor had been carried down the lighthouse tower, its lower extremity being carefully embedded in a stone perforated to receive it. If the object had been to invite the lightning to strike the tower, a better arrangement could hardly, he believes, have been adopted. He vetoed the proposal to employ a chain as a prolongation of the conductor, as the contact of link with link is never perfect.

A Simple Test of Kerosene Oil.

Take an ordinary pint tin cup. Fill it within an inch of the top with water warmed to the temperature of 120° F. Pour on this water three or four tablespoonfuls of the oil to be tested. Stir the oil and water together, and wait a short time, say a minute or two, for the oil to collect on the top. Try the thermometer again, and if the temperature is more than one degree from 120° F., add a little cold or hot water, as the case may be, so as to bring the temperature to within one degree of 120° F. Then stir again and give time, as before, for the oil to come to the top. Now apply a burning match or lighted taper on a level with the top of the cup, say within half an inch of the oil. If within one second no flash occurs, the oil is reasonably safe; otherwise, it is unsafe. Purchase four or five gallons of oil at a time, and apply this test at each purchase.—*Bulletin N. C. State Board of Health.*

Graphitic Carbon.

Mr. H. Warren has succeeded in producing a very dense graphitic carbon for incandescent electric lighting by passing the electric discharges from an induction coil between two electrodes inclosed in a vessel containing illuminating gas. The graphite forms at the negative electrode and gradually elongates toward the positive pole. This carbon burns in oxygen without leaving any residue. —*Annales Industrielles.*

Stove Bronzes and Tiles.

An unusually large number of stove dealers from out of town, says the *Mail and Express* (New York), have been in the city the last few days purchasing their fall supplies. There is the liveliest sort of a craze for stoves ornamented with fancy tiles and bronze images.

"Why, the stove has now got to be as ornamental as any other part of the house," said Mr. Henry Gleason, an active member of the Republican Club, who has made the subject of stove decoration a special study for years, "and the consequence is that just now all the manufacturers are doing their best to get ahead of one another in this matter of stove decoration. The result will be to put on the market this fall stoves that in ornamentation will surpass anything ever before made. You remember when Oscar Wilde was here, about six years ago? Well, the change began then, and was caused by his criticising our stoves and calling them of a pump log style, decorated with funeral urns. The same year a company was started to make tiles and bronzes for stoves, and the result is seen to-day in a complete revolution in the stove trade. Now the manufacturers are seeing who can turn out the most giddy stove. They are putting lots of money in it too. Many recent models are from plaster casts, and I know of complete sets of castings that cost $10,000 and $15,000 each."

Among the bronze figures that are the rage for stoves are Roman warriors, gladiators, Knights of the Red Cross on horseback, Charles V., Joan of Arc, which is a great favorite, and many "Mikado" characters. One of the favorite pieces is the "The Flute Players," which was modeled after the original in the Stewart collection. The figure is placed on the top of the stove, and does away wholly with all suggestion of the "funeral urn." All these bronzes are so tastefully got up and look so much like the real article that, as a rule, they are taken from the stove and used as mantel ornaments during the summer.

Another reason given why they are so greatly in favor is that a system has been discovered here for making them very cheaply. Sometimes the models are designed in this country, but in most cases an imported French bronze piece is bought and used as a model. This costs perhaps $10. The purchased model is divided into pieces with the aid of a blowpipe, and a separated plaster cast is made of each piece. This is done because it is impossible to cast cheaply the entire figure in one mould. From these plaster casts brass moulds are made, which, when finished, are given to the casters. Then begins the work of making the figures. One caster has, for example, the mould of the left arm, another that of the right arm, and so on until all parts are distributed. The different casters fill their ladles with molten spelter, each ladleful being enough to make a number of casts. Holding the mould in his left hand, which is protected by a covering of heavy cloth, the caster quickly pours the spelter through a funnel-shaped orifice at one end of the mould, until the latter is filled. As soon as the mould is filled the spelter is poured back into the ladle, leaving a thickish shell clinging to the inside of the mould. With a single blow the latter is opened, and out drops a complete cast of silvery-looking metal, the entire operation not having taken more than five seconds. The pieces are then taken to the trimmers, who, with machinery, cut away the uneven edges. Next the pieces are carefully joined and soldered by expert workmen. The next operations are "buffing" or smoothing the surface, which is done with a mixture of grease and find sand, and "washing," which is to dip the figure in potash and then wash it. Then the figure is ready for the plater, who gives it a wash in brass, copper, or other solutions, after which the finishing touches are put on, and it is ready for the market. The figure can be sold for $1, with a reasonable profit left for the manufacturer.

It is estimated that of tiles to be used in decorating stoves, more than one million will be sold this year. They are made in all tints and sizes, and in colors the American make now exceeds both the French and the English. More than 300 designs have recently been made up here, including romantic and ideal heads and scenes, warriors, celebrated people, flowers, etc., and the like. They are placed on all possible parts of the stove, and are particularly effective on the doors and open work around the center. Small tiles are also put on the knobs of the doors, and it is even beginning to be the thing to ornament cooking stoves and ranges in this fashion.

The clay used in making these tiles must be white, hard, strong, and of uniform shrinkage. To get this a mixture is prepared and ground to dust, the clear whiteness of which is due to the presence of North Carolina china clay. This dust is dampened and the clay is then ready for the press. This is an upright affair, with a long lever or a wheel operating a screw press. The lower end of the screw carries a die plate, and the bed has a matrix. From a box at his hand the operator takes a scoopful of the dampened clay dust, fills the matrix and evens it off. A turn of the wheel is made, and the die imprints itself sharply and firmly into the clay. The tile is now perfect in shape. Air drying for several days comes next, to evaporate all moisture, after which the clay becomes sufficiently hard to be handled without breaking. Before being placed in the kiln, for the firing process, the air-dried tiles are packed in earthenware boxes called saggers, which are tightly closed to preserve their contents from discoloration. When packed the saggers are carried into the kiln and built up in rows, tier above tier, until the entire kiln is filled. Then the door is built up with fire brick, the interstices are filled with clay, and the fires are started. After the firing is completed the tile is ready for glazing. A glaze is, in fact, a coating of glass. After being ground to dust, the glaze is mixed with water and applied with a brush, or the tile is dipped in it. After this comes the final firing in a muffled kiln, heated by radiation. This process lasts four days, and then the tile is ready for use.

Flower Farming and Perfume Manufacture in Southern France.

For nearly a century the culture of flowers on a large scale and the manufacture of perfumes and essences have formed a special and lucrative industry in Southern France. The principal district in which the manufacture is carried on is at Grasse, in the department of the Alpes Maritimes; but it is also conducted on a more or less extensive scale at Sommieres, Nimes, Nyons, and Seillans. The descriptions of flowers principally grown, and their season of harvest, are the violet, jonquil, and mignonette, which are usually gathered in February, March, and April, although, in mild, moist winters, the violets commence as early as December; roses and orange blossoms, with thyme and rosemary, in May and June; jasmines and tuberoses in July and August; lavender and spikenard in September; and the acacia in October and November. The flower harvest covers, therefore, about three-fourths of the year, but the season of greatest activity is May and June, when the roses and orange blossoms are gathered. Thyme, rosemary, and lavender are among the minor products grown principally by small farmers of the grape and olive, who have at home the simple apparatus for distilling the flowers, and they produce a more or less inferior class of essences, which are used to dilute and adulterate the superior essences produced at the large establishments in towns and villages.

Consul Mason, of Marseilles, in a recent report upon flower farming in Southern France, says that the conditions of industrial success in flower growing can be best studied by a specific example, and he quotes the case of a plantation at Seillans in the department of the Var. This farm is about twenty-three acres in extent, and is situated on the southern slope of the hills, about 2,000 feet above the level of the Mediterranean, and at a distance of twenty miles from the coast. The calcareous soil was originally naturally poor and thin, and the olive trees, which had occupied the ground for a century or more prior to 1881, yielded but scanty and unsatisfactory returns. The slope of the surface was so steep that the waters of a spring which flows from the rocks above the track could be but imperfectly utilized for irrigation, and the land was regarded as practically worthless. In 1881 the proprietor caused the olive trees to be removed, and the land prepared for flower culture. The ground was first dug up to a depth of four feet, the larger stones removed and built into sustaining walls for the terraces into which the surface was divided and leveled. Along the upper margin of each terrace a shallow ditch was cut, connecting with transverse channels which supply the spring water for irrigation. The abruptness of the slope will be indicated by the fact that, on the tract of eighteen acres, the terrace walls required to produce a series of level or gently sloping surfaces are over 2,000 yards in length. Thus terraced, the tract yielded about seventeen acres of prepared ground for planting. In the autumn of 1881, 45,000 tufts of violets and 140,000 roots of the white jasmine were planted. The following spring the remainder of the ground was planted with roses, geraniums, tuberoses, and jonquils, and a laboratory erected for the manufacture of perfumes. The position proved to have been well chosen, as the flowers grew vigorously and well, and in 1885, the fourth year after planting, this farm, which had previously yielded a rental of £23 a year, produced perfumes valued at £8,630, giving a net profit of £1,553. This is sufficient to illustrate how lucrative flower farming may become in favorable districts and under good management.

From observation at Seillans and in the neighborhood of Grasse, where perfume flower growing is the leading industry, Consul Mason says that the essential conditions appear to be an altitude of from five hundred to two thousand feet. Flowers grown on such elevated positions are said to be richer in perfume than similar varieties which bloom in valleys and lowlands; a soil rich in calcareous elements, a situation sheltered from cold northern winds, and not subject to the white frosts which in spring and autumn affect the damp lowlands. In countries like Southern France, where the rainfall is always scanty, and often wanting entirely from May until September, irrigation is essential to the culture of flowers as well as every other crop. It is said the perfume growers and distillers on the Mediterranean coast attribute their success not less to the peculiar climate of Provence than to their knowledge of every detail of the industry, a knowledge acquired by more than a century of experience, and transmitted from generation to generation. One essential principle in perfume culture is that all fancy and "improved" varieties of flowers are discarded, and the natural, simple, old-fashioned kinds are exclusively grown.

The roses on the slopes of Seillans are the common pink ones, and the single wild violet is preferred to all the larger artificially developed varieties. Only the white jasmine is used, the yellow and less fragrant variety appearing to be either discarded or unknown. Jasmine plants are set in rows about ten inches apart, and are closely pruned. Roses are grown on the lower terraces, and are also cut low, and the ground between the plants heavily manured. After the roses have been gathered, the stem is cut to within a few inches of the ground to preserve for the next season the entire vigor of the plant.

During the harvest season traders or "middle men" go through the country every day with wagons collecting flowers from the farms, for which they pay prices varying according to the extent of the crop and the demands of the market. Their loads are hurried to the nearest manufacturer, and delivered while the flowers are still fresh and crisp. The flowers are usually gathered in the morning, as soon as possible after the dews of the preceding night have disappeared. The manufacture of perfumes includes the making of pomades and oils by the process of absorption, and of essences and essential oils by distillation. Every complete establishment is provided with apparatus for all these processes. Pomades are the commercial vehicles for absorbing and transporting the perfumes of the jonquil, tuberose, jasmine, and other species of flowers. A square frame or *chassis* of whitewood, about twenty inches by thirty in size, is set with a pane of strong plate glass. On either side of the glass is spread a thin even layer of grease—two parts lard to one of tallow—which has been purified and refined by previous boiling and straining. Thus prepared, the frames are piled up in ranks, six or seven feet high, to await the season of each special flower. When the blossoms arrive, the petals are picked from the stem, and laid so as to cover the grease in each frame. These being again piled so as to rest upon their wooden edges, which fit closely together, there is formed a species of tight chambers, the floors and ceilings of which are of grease, exposed to the perfume of the flower leaves within; the grease absorbs the perfume, the spent flowers are removed daily and fresh ones supplied, and this process goes on from two to four or five months, according to the desired strength of the pomade, which, when sufficiently charged with perfume, is taken from the glass with a wide, thin spatula, and packed in tin cans or *stagnons* for export. By these methods the delicate odors of flowers are extracted, and retained for transport to distant markets, where the grease, being treated with alcohol, yields the perfume to that stronger vehicle, and produces the floral waters and extracts of commerce. Coarse pomades are made by boiling the flowers in the grease, and subjecting the residue to pressure. The spent pomades are used for toilet purposes and in the manufacture of fine soaps.

The process of preparing perfumed oils involves the same principle, except that instead of solid grease, superfine olive oil is used. With this oil, pieces of coarse cotton fabric are saturated, which are then spread upon wire netting framed in wooden *chassis* about three feet by four in size. The flowers are spread upon the saturated cloths, and the frames piled one upon another, so that the perfume of the flowers is absorbed, as in the previous process. Essences and scents are produced by ordinary distillation, in which the flowers are boiled with water in large alembics. The vapor carries off the perfume, and is condensed in adjoining copper tanks. Some of the retorts used for this purpose are of sufficient size to receive at once half a ton of fresh flowers, with the requisite water for their distillation. When scents are to be produced, alcohol is used in the distilling tank to receive the perfumes. By skillful combinations of the perfumes of different flowers, sometimes with the addition of chemicals, a large variety of scents, such as "patchouli," "jockey club," etc., are produced at the original laboratory. The work of the manufactories is largely done by women, who earn from tenpence to one shilling for a day's labor of ten hours, and during the busy season of roses and orange flowers, they earn half as much more by working until midnight, or even later. —*Jour. Soc. Arts.*

Pneumonia.

It is generally supposed that pneumonia is due to the accidental penetration of specific microbes into the system, but the observations of M. Jaccoud, a French student of the subject, show that the disease really results from the development, under favorable conditions, of microbic germs permanently present in the system. A chief condition of such development is a sudden chill, which explains the frequent coincidence of lung affections with abrupt changes of temperature.