ALUMINUM IRON AND STEEL.

T. Nordenfelt, of London, has taken the following English patent:

It is well known that one of the great difficulties in making castings from steel is to get a product which is solid, sound, homogeneous, or free from blisters or cavities. Lately the manufacture has been much improved by adding to the metal ferro-manganese and other compounds containing carbon, silicon, and manganese. But although these admixtures make the product somewhat more solid, they deteriorate the quality in other respects, as the product gets harder and more brittle or red short. It has been impossible to make castings of wrought iron or mild steel at the same time solid and retaining their qualities and their strength.

I have found that castings of wrought iron or mild steel may be obtained solid without changing the intrinsic quality of the metal, by the addition of the metal aluminum either alone or in the shape of an alloy. The aluminum makes the molten metal more liquid, thus the gases in the metal pass easily away, the metal runs easily into the moulds, and a more perfect product is obtained. I have found that even a minute quantity of metallic aluminum added to the molten iron has an appreciable influence.

By this, my new invention, I have succeeded in making perfect castings from the softest wrought iron, which castings in every respect retain their ductility and nature of wrought iron, though their tensile strength is greatly enhanced.

The iron or steel is melted in crucibles, converters, or metal smelting furnaces of any description, and the addition of the aluminum or alloy of aluminum is made to the metal when molten, shortly before it is to be poured. The addition may, however, be made earlier.

It is convenient to provide a plug in the cover of the crucible, which is removed when the metal is completely melted, a tube is inserted into the aperture, and the aluminum to be added is passed down the tube. The tube is removed and the plug replaced, and the metal is soon ready for pouring.

What I claim as my improvements in the manufacture of castings from wrought iron and steel is the admixture of metallic aluminum or aluminum alloy with the melted iron or steel before casting the same into moulds, substantially as described.

THE ICE PALACE AT ST. PAUL.

BY H. C. HOVEY.

The saying that "men are but grown-up children" is well illustrated by the building of costly edifices of a substance known to be ephemeral in its nature, and that can be of no conceivable utility while they last. Yet they take their place among human affairs, and are occasionally worth describing even in the sober columns of a scientific journal.

The "St. Paul Ice Palace and Winter Carnival Association" has been incorporated for the term of thirty years, with the intention of building a palace and holding a festival every winter. The success of its first attempt has been marred by the remarkable instability of the weather—which can usually be depended on in this latitude. While there have been a few very cold days, this has been comparatively "an open winter;" and fears were at one time had that the project would actually have to be postponed to another year. But, at last, a favorable cold snap came, and the structure was reared.

Building with ice is, of course, in some respects, very much like building with granite or marble; yet it has its peculiarities. The quarry is the frozen Mississippi River, from which blocks may now be cut twenty inches thick and as clear as crystal. The first thing done is to scrape off the snow and soft surface ice, which is effectually done by a wooden scraper fifteen feet long, drawn by horses. Next the smooth surface is marked off by steel knives set in a wooden beam, the area thus treated resembling an immense checker-board. These teeth are adjustable, so that blocks of the various sizes required can be marked off. Sawyers then cut the ice, following the lines already thus traced. By means of hooks and poles, the blocks are lifted from the water and placed on long sleds in waiting, and drawn to the site of the building. Heavy tongs and derricks are next in requisition to swing the blocks to their places, where masons are ready with suitable tools for chipping off the rough parts, so that each block shall fit snugly to its place. Water is then poured into the seams, where the cold at once congeals it, thus cementing the wall as it goes up. Work so simple as this progresses rapidly, and repairs that may be needed can be readily made as long as cold weather lasts.

A noble location was secured for the ice palace, comprising eight acres in the very heart of the city, and adjacent to the State Capitol. In the center of this broad area rises the glittering structure, 180 ft. long, 154 ft. wide, with towers 106 ft. high. The architectural design is excellent, with square towers and round ones, and various arches, flying buttresses, and other features. Thirty thousand blocks of ice were used in completing the structure, and 200 men were employed in its erection. The total cost has exceeded $20,000, including approaches and decorations. The interior is divided into spacious halls, chambers, and corridors, with a stairway for reaching the summit of the main tower. In several rooms there are elaborately carved statues cut from huge blocks of ice, and with so much skill that one can only regret that the labor has been expended on such fragile material. Imagine Powers' "Greek Slave" reproduced in rock crystal! Many of the blocks in the walls are so very clear as to take a rich blue color from the blue sky overhead, while others on which the rays of the sun directly shine seem like dazzling cut glass. At night the building is lighted by electricity, and fine artificial effects are also produced by colored lights and pyrotechnic displays.

The surrounding grounds are decorated with evergreen arches, and in other ways. A village of sixty Sioux Indians, with their skin tepees and primitive features of aboriginal life, is located in one corner of the extensive park. Elsewhere there are ponds for skaters and curlers, areas for snow-shoe races, slides for the tobogganers, and provision for other winter diversions.

It might be added, that, along with the ice palace, has come a wholesome epidemic for out of door recreations, in which people readily indulge, even though the mercury may fall far below zero. Toboggan slides have been constructed at St. Paul and Minneapolis, some of which are more than 1,500 feet long. More than one hundred snow-shoe clubs have been organized in Minnesota during the past two months, with not less than 4,000 uniformed members.

Since writing the foregoing account, the warm "Chinook" has come, which threatens the speedy destruction of the ice palace if it should last many days. It is interesting to note the effect produced on the blocks near the foundation of the massive walls. Of course a great pressure comes upon them, and as they begin to thaw they assume a columnar structure, each block seeming to be made up of hundreds of slender prisms. Possibly before this appears in print, the whole fairy-like palace may have dissolved, "like the baseless fabric of a vision;" but as a feature of Northwestern enterprise at play, it is worth describing.

PHOTOGRAPHIC NOTES.

A New Enlarging Easel.—At a demonstration showing the utility of the permanent bromide paper for enlarging purposes, recently given before the Society of Amateur Photographers in this city, there was exhibited and used a new easel for holding the paper, which had been presented to the society by the Eastman Dry Plate and Film Co.

The easel was intended to facilitate the placing of the paper in position to receive the enlarged image, and fulfilled the purpose very perfectly.

Upon a square frame which rested on the floor were secured two uprights rising four and a half feet; in these were longitudinal slots and grooves. The exposing screen, covered with smooth, hard, white paper, was slid down between the uprights, in the grooves, and held at any desired height by clamping screws which passed through the slots to holes in the edge of the exposing screen; to raise or lower the latter it was only necessary to unscrew the clamping screws. Hinged to the front of the exposing screen was a black, wooden clamping frame, swinging open like a door, and caught at the other side of the screen by a flat spring catch.

In the door frame could be put kits of smaller size for convenience in securing small sheets. On brackets at the top of the screen was supported a neat rectangular box about six inches square, divided into two parts, the upper portion being hinged at the rear upper corner. When the cover was opened, the paper, could be fed out of its lower corner directly on to the face of the exposing screen. The roll of sensitive paper having in its center a wood spool, was supported between two uprights fixed on the inside ends of the box, so arranged that the spool could be easily lifted out or dropped into place. A spring pressure bar pressed against the surface of the roll, preventing it from unwinding too rapidly.

To operate the easel, the hinged frame was opened, then the cover of the box; the free end of the paper was next brought down over the face of the exposing screen; then the lid of the box was dropped, and the door frame shut and latched, which firmly clamped all the edges of the paper in position and prevented it from curling. After exposure, it was only necessary to cut off the exposed portion with a pen knife and tuck back into the box holding the paper the free end of the roll. The operation of affixing the paper was extremely simple, entirely dispensing with the bother of pinning to the screen a large loose sheet, which has heretofore been the usual way of doing it. The easel was adaptable to different widths and rolls of paper, and single loose sheets could be easily located in position. It will be seen that the convenience afforded by the employment of this easel will doubtless bring it into very general use.

Spectacle Photographs.—At the same meeting at which the enlarging easel was shown, there was exhibited a 5 x 8 photograph, remarkable for its clearness and depth of focus, made with an ordinary spectacle lens, inclosed in a common wood pill-box for a lens tube, the whole said to cost but twenty-five cents. Every portion of the picture appeared to be perfectly sharp. We have obtained the following particulars: The glass is a common spectacle meniscus (periscopic), having in the rough a clear diameter of 1½ in. and focal length of 18 in.

Generally these glasses are not round, but can be cut by any spectacle maker to fit the metal frame.

In one end of a wood pill-box with the bottom removed was placed the lens with its concave surface outward, and one inch forward in front of this concave surface was the diaphragm, ¼ in. in diameter.

Respecting these lenses, it was said that there was no reason to suppose that for comparatively long focus they should not in a measure supersede many of the cheaper forms of achromatic lenses for amateur work; since they are so extremely thin, the chromatic aberration is practically unimportant, while the spherical aberration is also reduced to a minimum.

The rapidity of spectacle lenses is also somewhat remarkable. The exposure given to the plate was said to be but three seconds.

The spectacle camera will doubtless present a favorite means for beginners to practice photography, especially to boys and others who cannot afford expensive apparatus.

Upholstering a Cow Stall.

A neighbor who uses an old horse barn for keeping his one cow, found that when the thermometer indicated from 10 to 20 degrees below zero, his cow stood shivering in her stall, even with an abundance of good food to eat and warm water to drink, and that the quantity of milk given was also reduced below the usual flow. Being ingenious as well as merciful, he went to work, with such material as he could find at hand, to make his animal more comfortable. The stalls were ten feet high, the stable large, and the outside boarding somewhat loose. In other words, the ventilation was abundantly provided for. To recover the entire building was out of the question, and even were the outside fairly tight, so large a barn with only a single animal in it would still be excessively cold with such a temperature outside. The better way seemed to be to make a small room for the cow, in which her own animal heat would be better retained.

Accordingly, a single horse stall was floored over with loose boards above the cow, giving just room for the attendant to stand. This floor was then covered with old hay and straw to the scaffold floor above. The sides of the stall were made tight by battens and stuffing, and the front closed up with a door that could be opened for putting in the food at feeding time. At the rear, the supply of boards having been exhausted, old carpets, sacking, etc., were hung in several thicknesses across the stall from side to side, being tacked securely to the staging above. The cow was thus shut into a room but little more than large enough to contain her with comfort, and comfortable it was compared to the large open space she had previously occupied. Much might be done in this, or other ways, to render farm stock more comfortable and more profitable to keep during these excessively cold spells. If stables are tight, and not too large in proportion to the number of animals, their own bodies will warm the air sufficiently for comfort. There is little occasion to worry about ventilation when the temperature gets below zero. The danger, in nine cases out of ten, is in having too much rather than too little.—*N. E. Farmer.*

Preparation of Paraffine Moulds for Plaster Casts.

BY F. L. TETAMORE, M.D., OF NYACK, N. Y.

Prepare the specimen or preparation, making it as clean as possible; place on oiled paper, in a position that will show it to advantage. Soft projections may be held in position with threads suspended from a frame or from a heavy cord stretched across the room. Paraffine melted in a water bath is painted over the preparation with a soft brush, the first layer being put on with single and quick strokes, that the rapid cooling of the paraffine may not cause the brush to adhere to the preparation, thus drawing the soft tissues out of place, until the mould is formed about one-eighth inch thick; all undercuts must be well filled. When the mould is hard, it can be readily separated from the preparation; it is then well washed with cold water. Stir fine dental plaster into cold water to consistency of cream, pour into the mould and out again several times, so that there will be no air bubbles on the surface, then fill the mould and let it stand until hard. Place the whole in a vessel containing boiling water until the paraffine is all melted; wash with clean boiling water. When the cast is thoroughly dry, it may be painted with oil colors by coating it first with shellac varnish. Casts of any part of the body may be made from a living subject, if the parts are not too sensitive to bear the heat of the paraffine, which is about 150° Fah.—*Annals of Surgery.*