tests for a good quality of steel, and this is not visible quite so frequently as might be generally imagined. On the contrary, a great majority of steel fractures show crystals arranged in parallel groups or bundles as before described, but clustered together in several distinct crystalline layers which are not parallel to each other. The consequence is that the needle-points, visible under the microscope, appear to cross each other at certain places, or at least they point in such directions that, if elongated, these lines would cross each other at a short distance in front of the fractured surface. Wherever the crossing actually takes place, a ridge or line is generally visible to the naked eye, and the color of the two parts of the fractured surface which contain the different groups is different, since the light which falls upon one group at the proper angle for reflection will be in such a position with regard to the other group as to throw the points of the crystals into the shade. The one part of the surface, therefore, will appear bright or silvery white, while the other will look dark or gray in color. As usual, inferior specimens are more instructive than the best qualities, because there the peculiarities and faults come out most strikingly. We have seen a piece of a Bessemer steel-block, from a spoiled charge, in which the crystalline structure of the spiegeleisen was seen in some spaces, particularly at the edges of the air-bubbles, perfectly distinguished from the close grained crystals of the mass of steel all round. This mass, however, contained groups of very different character within itself. In a specimen of steel or iron made by another process we could discover clearly defined crystals of pyrites, indicacating the existence of sulphur in an unexpectedly tangible manner. Repeated melting, heating, or hammering of steel has in general the effect of reducing the sizes of crystals, and also of laying them more parallel. Still there seems to be a difference between the treatment which gives parallelism and that which causes the reduction of sizes in the crystals. The former seems to be principally due to the action of the heat, and repeated melting is the great panacea in this respect. The small-sized crystals, or what is called fine-grain, can be obtained by mere mechanical operations. In fact, hammering at a dull red heat, or even quite cold, is known to produce the effect of making the grain of steel extremely fine. This is a property, however, which is lost by reheating, and at a sufficiently elevated temperature steel seems to crystallize in large grains, which remain if it is allowed to cool slowly and undisturbed by mechanical action.—*Engineering*.

Sleighs and Sleigh-making

As the season for using sleighs approaches, a few hints in regard to their construction will not be out of place. The manufacture of sleighs is carried on, to a greater or less extent, in all of the New England States, in Northern and Western New York, in the northern part of New Jersey, and the northern portions of the Western States. A few are built in other sections, but there is so little call for this work in more southerly latitudes that it is almost impossible to find workmen, outside of the localities we have mentioned, who can turn out a creditable sleigh.

The most popular sleigh ever introduced is that which goes by the name of the "Albany jumper," and it is the prettiest sleigh in use at the present time. The "Portland" sleigh has for some time contested the lead with this favourite, and meets with many admirers, it being both lighter and cheaper. A new and pretty style of sleigh is now made, with a body very much like the Victoria phæton in general appearance; the seat can be made separate from the body if desired. The body is either finished with a slab side or paneled; if paneled, the bottom rail must be bent. The same pattern may be used as with the "Albany jumper," and also the same top pillar. The body of the front of the seat must be about eight inches deep; the seat should pitch back about three-quarters of an inch, and be framed in the bent bottom side. The body should flare about half an inch on each side at the front end of the seat, which must project over the side of the body about four inches in front, running nearly straight to within six inches of the back, at which point the round corner begins. The seat is eight and a half inches deep at the front corner, with three inches flare. The Stanhope pillar and the moulding connected with it should retain the sweep of the "Victoria." The back of the seat should be eighteen inches in the center, and about twelve inches at the corner, and if it be made loose from the body care must be taken not to break the sweep of the back quarter; with proper attention this sweep may be kept perfect, and one or two inches sweep be put in the back. This, if made solid, will require a plank about three inches thick. Another way of making the seat is to let the bent piece run up the back, mortising in a back rail and paneling it the same as any other. The ends may be got out of one-inch whitewood, with a three-inch corner block; screw this corner block against the bent rail, and round off the corner until it comes to the edge of the back molding. The body in front of the Stanhope pillar, should be about five inches deep, running up to a point where it comes in contact with the runner; it should measure about two feet in front of the seat, and nineteen inches on the seat. The running part should be made light and strong, nothing but the best of timber being used throughout; the knees should be about three-quarters of an inch thick by an inch and a half at the top, and the same thickness as the runner at the bottom. The middle knees should not be less than eighteeen inches long between the shoulders, framed in the runner, so that the spaces will be the same between them, and at the same time pains should be taken to have the front knee-frame in the runner at a point about three inches from the ground. When the runner is set up, allow at least six inches brace to the front and back knees. The runner should be about one inch deep by one inch thick, and be allowed to run back at least three inches beyond the extreme end of the body, Care should be taken that the dash is not made too high: all that is required is to have it high enough to stop the balls from the horses' feet.

The fenders should be framed about nine inches from the body, not over three-quarters of an inch square, and neatly chamfered, leaving a place between the front and middle knee for a step-plate. There is no need of loading down the sleigh with iron work: the T-plates, with the under braces,