

ground on one side from evaporation. In these respects, therefore, every field and house in the country, and probably every house and street in town, has its own peculiar climate.—*Sanitary Reporter.*

Machinery and Manufactures.

SCRAP-IRON FORGINGS.

We once asked a blacksmith, of great experience in his trade, his opinion of making fine forgings for first-class work out of scrap-iron; whether merely accumulating shreds of iron and fagotting them up indiscriminately would produce a super-fine piece of material at the completion of the job. The answer was laconic and unequivocal; said he—"Good scrap-iron will make good material, and poor iron will always be poor iron." This is precisely our own opinion in most respects. Skilful manipulation and successive heats may indeed make inferior iron a little better than it was, but the idea that superior forgings can be made out of refuse scrap, or bits of poor iron, is an erroneous one, palpably so to those who will take the trouble to think for a moment. In establishments where only the best iron is used, such as the Ulster, Luke Superior, or Salisbury brands, the scraps will of course be of the first quality; but as for the miscellaneous combination of every conceivable sort of cuttings that are sometimes "piled" in blacksmith-shops—such as curry-comb backs, old iron skates, kitchen poker, bits, auger-shanks, or ordinary rolled iron—making good iron, it is unreasonable to suppose it.

"But," says the practical reader, who possibly objects to this view, "no matter if the quality of the iron is inferior at first, you have admitted that successive heatings and workings will improve it so much that at length it becomes of an excellent quality." Our answer to this is that the experiments of Mr. William Clay, an Englishman, who has made the subject a study, prove that, up to a certain point, working iron over and over is advantageous; but after the maximum is reached the strength decreases in the same ratio that it rose. In twelve experiments with ordinary No. 1 iron (whose original tensile strength was 43,904 pounds), through six trials the strength was increased to 61,824 pounds, but upon continuing the working of the same iron up to the twelfth experiment, the quality deteriorated to the original figures, 43,904 pounds.

From these experiments it is easy to see that iron highly refined, and particularly scrap-iron which may have been worked and re-worked an infinite number of times before it was piled, is the very worst material that can be used for forgings that require great strength, homogeneity, and tenacity. For another reason scrap-iron is bad for large forgings, and that one is the different welding points at which different qualities of iron unite. Iron manufacturers are well aware of this peculiarity, and in piling iron for rolling, the hardest and most refined metal is placed outside, and the softest, or what is known as puddled iron, in the centre of the mass. Were it not for this precaution the exte-

rior would be burned before the center was fully heated.

Gun barrels, known as the stub-and-twist, or Damascus pattern, are made from scrap-iron and steel, but of the best quality, and they are more valuable from their peculiar appearance than from any special value in the selection of the material or the manner of their construction. The "regulation rifle," made at Springfield, is rolled from pure soft iron, and is one of the strongest weapons of its kind in the world. There are very many places where scrap-iron forgings can be used with economy and to great advantage; in fact there is no other way of utilizing the continual waste of the smithery; but where a uniform and even wearing surface is required, scrap-iron is the worst that can be used. The practical workman knows that in turning a scrap-iron shaft there are many degrees of difference in the hardness of certain portions, and we can call to mind several instances where pieces of hard steel have been cut out of journals and replaced with soft iron. Many engine shafts pound in their bearings in spite of all the efforts of the engineer to prevent it, by lining up or screwing down, and very often the trouble can be remedied only by turning the journal anew. Some portions of it were softer than others, and wearing faster, caused the shaft to become oval, so that the more the "binder" was brought down the worse it behaved. Links for working valves, in fact all parts that require homogeneity, either for bearing surfaces or mere finish, should be made from iron of one kind, if it is desired to obtain the best results.—*Scientific American.*

STEAM BOILER EXPLOSIONS.

The following practical remarks conclude an article on "Locomotive Boiler Explosions," in the *London Mechanic's Magazine* of a recent date.

"The time has almost gone by, when an explosion was regarded as the result of mysterious agency. It is pretty well known now, that but two causes can lead to the bursting of a steam generator under the conditions of legitimate working. These are simply congenital weakness, due to bad materials or an imperfect method of construction, or induced weakness, the result of overheated plates, or corrosion. More than 80 per cent of the explosions which occur yearly are the result of this last cause. If we take a hypothetical case of three boilers, of precisely the same form and construction, worked under precisely the same conditions, and exposed to like sources of deterioration, but carrying different pressures; the time when each will explode may be as certainly reckoned on as the moment when a watch wound up to-night will be completely run down. Suppose that one carry 100 lbs., another 75 lbs., and the last 50 lbs. of steam; the first may last five years, the second seven, and the last nine or ten years, simply because the process of destruction may have so far weakened all the boilers that, in five years, they are incapable of carrying 100 lbs. steam, but yet retain strength enough to carry 75 lbs. Therefore, only that one carrying 100 lbs. will be destroyed then; the others must wait until corrosion has done a little more, but they will go in turn. The end of all