general and the example noticed more by engine-builders and machinists. Our stationary engines are generally loaded with grease and dust, whereas a little painstaking and attention would save hundreds of dollars, and add to the character of those concerned.

There are few English machine-shops in which there cannot be found a fine specimen of workmanship in the shape of the "shop engine." Every employee will go in to look at "the engine running the works" and will find fault or praise, according to its condition. This serves also as a model to exhibit to contractors—a model of first-class workmanship and finish—a model of good working and economy—a model of neat and good arrangement—in short, a specimen of what can be made at the establishment. The idea seems to prevail *here* that any old engine which will turn shafting answers the requirements of a machine-shop, but we opine that contractors should not have to be directed to other establishments besides the machine shop for samples and specimens of work constructed there. There are other machinists, however, who do take pride in showing the "shop engine;" but where we find one that does there are scores of those who revel in oil, dust and dirt. The nature of the work is a poor excuse for such a state of things.—*The American Engineer.*

COVERING PIPES AND RESERVOIRS FOR THE CONSERVATION OF HEAT.

A writer in the *Builder*, in the course of a series of articles on "Hot Water Supply," says there is no branch subject in connection with hot water works deserving so much attention as that which forms the heading of this article. It is no exaggeration to say that very shortly no apparatus for hot water supply will be considered complete or finished if the whole system is not insulated, so to speak, so that almost every particle of heat absorbed by the water in the boiler will be obtainable from the taps, instead of nearly 50 per cent of it being radiated from exposed surfaces and worse than wasted.

There are at this moment hundreds, if not thousands, of hot water systems that, by being carefully covered, would be converted from miserably inefficient to highly satisfactory appliances—this in particular with the tank system, when the tank is so commonly fixed in a cold, draughty roof.

An interesting instance of the success attending the covering of pipes occurred quite recently, in which a residence was fitted with a complete system of hot water supply pipes on a scale sufficiently large for a good boiler in a 5 foot kitchen range, but owing to a delay experienced in obtaining the range in question, another of a smaller size, 3 feet, was fitted up and connected to the chimney and circulating pipes for temporary cooking and hot water supply. It was not supposed that this little range with its boiler would do much in the way of water heating, but to the astonishment of every one it gave a really abundant supply of very hot water in every part of the house as quickly in the morning and altogether as satisfactorily as a larger range would be expected to do.

This desirable result was wholly brought about by the pipes and cylinder being everywhere carefully covered with a sufficient thickness of felt, so that however hot the water was within the pipes, no heat could be felt outside the covering, a sure indication that no heat was being dissipated.

It really does seem opposed to all reasonable and workmanlike principles to allow such abundant opportunity for heat to be thrown away, while labor and fuel is being expended in the kitchen apparently for this object. If a fitter or maker of steam engines and appliances did not attend to the subject of this paper in a thorough and workmanlike manner, he would be considered to have hardly mastered the rudiments of his business. The waste of heat is not always the only ill result experienced, as in many instances the warmed air is very objectionable, and if a hot water pipe is carried alongside a soil pipe, it is possible for a very unpleasant feature to introduce itself. It is a very customary practice for a hot water fitter to carry his pipes up in the casing that is nearly always to be found passing from the bottom to the top of the house, this casing containing all the different pipes of the house, such as the cold service from the main, the cold service down from cistern, the water closet cold water service, and, very commonly, the soil pipe. There is no objection to his making use of this casing if it is large enough to hold a few more pipes, and it is often used of necessity, as to carry pipes openly through well decorated rooms is out of the question; but to carry hot water pipes up this case without felting them is an exceedingly bad practice, as they are not only brought into contact with the very cold surface (they have frequently been found wired on to cold pipes, four or five pipes in a bundle), but the heat radiated causes a draught or current of air to set in, as we find in a chimney.

When a casing contains pipes that radiate heat, that casing, within a few moments after the heat is felt within it, is converted into a flue, as by applying heat to air it can be made to circulate to all intents and purposes like water. Air that is brought in contact with heated surfaces becomes heated and rarified, and, being thus made lighter than the surrounding air, rises, and cold particles immediately flow in to take its place, they becoming heated and following the first particles, and so on, so that it resolves itself into a stream of warm air flowing out of the upper part of the casing, and cold air flowing in in corresponding volume below. This may be excellent in practice when hot water pipes are used for effecting ventilation; but it is fatal to hot water services which are particularly required to keep the heat within them. In many instances they are cooled at about the same speed as they would be if placed outdoors when a strong wind was blowing.

It may be argued that if the casing is stopped off at its two extremities, the trouble will be obviated; and so it would be if the casing was *perfectly* air tight everywhere, and had no cold pipes within it. But this is never the case. There are always numbers of crevices and apertures which permit of a tolerably free ingress and egress of air.

The best material for covering these pipes and also the reservoirs is hair felt. Hair is a naturally poor conductor of heat, and nothing surpasses it for this purpose, especially as it is so easy of application. This felt, which is readily obtainable in sheets, is usually cut up in strips for pipe work; the strips are