

### The American Watch Industry.

John Fernie, M.I.C.E., writes from Philadelphia, in *Engineering*, December 3, as follows, on the American watch manufacture:

"I always read with great pleasure the words which fall from Mr. Head, the able president of the Institution of Mechanical Engineers, and I am sure he will pardon me when I call his attention to a great omission he made in his remarks about the American Watch Co. Mr. Head, like a good many more Englishmen who speak about American machinery, gets the facts all right, but does not get down to the philosophy of the facts; and this, I observe, has been the case in like discussions in England about American bridges. Now, in 1876 I visited the watch works at Waltham, and a long account from my pen was published in the *Times* of what I had seen there. This paragraph I copy from the letter:

"I was desirous of seeing how they obtained their scale, and Mr. Webster, the able engineer of the company, informed me he found the thousandth part of an inch too coarse a dimension and the ten-thousandth too fine, and he was led to divide the millimeter into a hundred parts, and found it a proper proportion for his work; and it is from a series of gauges founded on this system that the whole of the watches are built up and the constant accuracy of all their dimensions maintained."

"Now in this scale, this series of gauges, lies the philosophy of the success of the American watch, because it is the foundation on which stands the accuracy, repetition, the almost perfect duplication, of a perfect machine, which no one can make any finer. The ordinary fineness of work for the principal part of the watches is 1-2540 part of an inch, but for the very finest work they can subdivide this into 1-5080, or even 1-10160 part of an inch, and in the manufacture of standard gauges they can work to the 1-25400 part of an inch. Now what has grown out of this system since 1876? The old factory torn down and doubled; hand machinery replaced by automatic machinery; watches made for half the cost; quantity increased three or four times; quality immensely improved; in 1876 they were turning out 366 watches a day, in 1886 they were turning out 1,200 watches a day; and now I come to my moral, and apply the wise warning words of Mr. Head about watches to the manufacture of locomotives in England:

"They began by studying the watch as a piece of mechanism. They selected the best points of any current type. They abandoned the pin (*sic*) and chain. They introduced improvements of their own. They settled on a standard type, determined to adhere to it; made certain sizes and no others. Result: Killed the watch trade in England, and would have killed it in Switzerland had the Swiss not adopted the American system and machinery."

### IMPROVED STEAM DIGGER.

Our engraving shows an improved form of steam digger, recently made at Thetford, Eng., by Burrell & Sons, from the plans of F. Proctor. The machine is said to work well, and, according to the *Engineer*, is likely to prove valuable. The machine is provided at its rear end with a series of three digging forks, which alternately enter and break up the ground, and the vehicle advances as fast as the diggers perform their work. This device appears to be capable of operating on uneven ground. When not employed in breaking the soil, the machine may be used for various other agricultural purposes.

### To Re-ink a Type Writer Ribbon.

J. S. D. writes about type writer ribbons:

"Some time ago I tried the experiment of re-inking a ribbon, with such success that I never expect to buy one again. In two ounces or more of any ordinary writing fluid put a spoonful of thick gum arabic mucilage and a teaspoonful of brown sugar, warm the mixture, and immerse the ribbon long enough to become well saturated. When dry, spread the ribbon on a board and brush it well with glycerine. Should there be too much 'color' in the ribbon, press it out, between papers, with a warm flatiron; or, if too dry, brush it again with glycerine. The secret of the ribbon giving out its color is in the glycerine, and if you have body enough in the color, there is no danger that it cannot be made to work well. Such a ribbon is not affected by the dryness or humidity of the atmosphere, and I esteem mine as much better than any obtained from the trade.

"It may be that I was fortunate in hitting upon just the right proportion of the different constituents, and possibly a second trial might not be so successful; but I think with a little care any one could do as well with the same or similar means. My object was to get

body to the color, hence the mucilage and sugar. Then it was necessary that the ribbon should retain a certain degree of moisture, for the gum and sugar make it dry and harsh, so the glycerine coat was put on; but there was danger of smearing the paper with too much moisture, or a wrinkled surface, and the ironing obviated this."

### HOW LARGE DOES IT APPEAR?

T. BERRY SMITH.

I give a method which I have found useful in giving to students of the microscope some adequate idea of the dimensions of animalcules found in stagnant water.

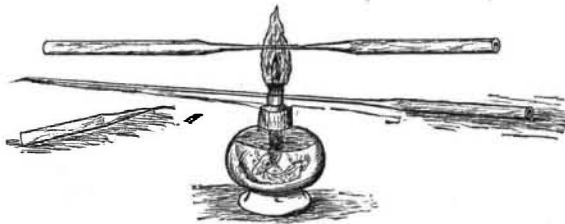


Fig. 1.—DRAWING THE GLASS TUBING IN ALCOHOL FLAME.

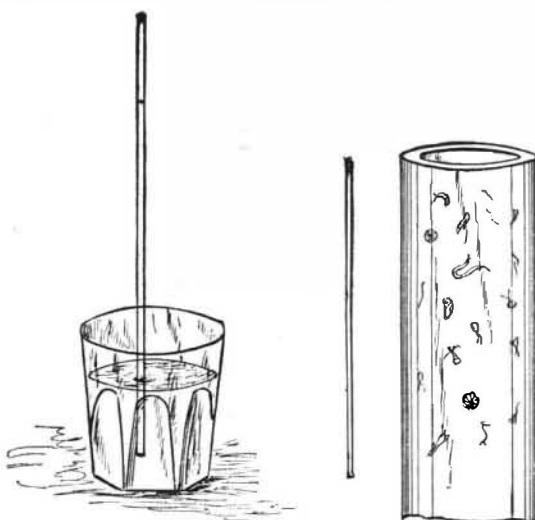


Fig. 2.—FILLING THE TUBE BY CAPILLARY ACTION.

Fig. 3.—THE TUBE, AND THE TUBE ENLARGED SHOWING ANIMALCULES WITHIN.

A drop of apparently clear water may be placed on a glass slide, put under the objective, and cause wonder and astonishment when the multitudes of animalcular life are brought to view. There they are, swimming, twisting, standing, but how large are they? Don't know, because there is nothing to compare them with. Take a piece of soft glass tubing and soften it in the flame of a gas or alcohol lamp, and then draw it out into a very fine thread, which will be a capillary tube (see Fig. 1). That it is a tube may be proved by inserting one end in water, and blowing into the other end, when minute bubbles will rise. Now, insert this tube in a cup of stagnant water, and the water will readily enter it, rising perhaps several inches above the surface of the water in the cup (Fig. 2). Hold the tube



IMPROVED STEAM DIGGER.

before you. No larger than a hair of your head, and the bore much smaller. Is it possible there are living creatures in that small space?

Place the tube under the microscope, and lo! many a curious creature disporting itself in as much space as a man would have in a wide street of a city (Fig. 3). I have seen them where it would take at least a score of them placed end to end to make a chain long enough to reach across the space in the tube.

How large are they? Hold up the glass thread before your eyes and consider. It is small, the bore is smaller, and they are twenty, perhaps fifty, times smaller still. Yet each is a perfect creature, with organized structure, and organs adapted for various functions. How large is one's mouth, foot, heel? Where is the limit?

"Tis said that all the larger fleas have lesser fleas to bite 'em, And these in turn have smaller fleas, and so *ad infinitum*?"

### Interchangeability of Machinery.

Mr. David Beddie, writing from Blayney, New South Wales, to the *Ironmonger*, raises certain questions which merit the attention of implement and machinery manufacturers. He complains of the multiplicity of patterns of various parts of harvesting and other machines, and instances fingers, intersections, braces, and connecting rods as parts which he thinks might with advantage be reduced to about half a dozen standard forms. In knife sections he complains that the rivet holes vary, while in the fingers the bolt holes are not alike. In consequence of these variations it is often difficult, and even impossible, to get extra parts; and, as these are not made in the colony, much trouble and loss are caused. As examples Mr. Beddie furnishes the following particulars:

"Last year I altered some old fashioned wrought iron fingers to the steel plated fingers of a popular American maker. This year I got some more to alter. I set to and drilled the bar, etc., for the alteration, and sent for the fingers, and was informed they were not to be had in Australia. I sent to the agent for some Hornsby fittings four months ago, and have not got them yet. I ordered some shares for Ransomes, Sims & Jefferies' Scotch grubber, and am informed they are not to be had. I ordered a Pulsometer No. 1 pump from the agents, and was informed they had none. I asked them to get one from their branches in the other colonies, or say how long until they would have one. To the first part I got the answer 'none,' and to the second that they could get it in, 'say, four months.' I have written six letters over it, and have not had one yet. In some of the replies I was informed that a Mr. Clarke could make one in Melbourne in two weeks from receipt of order. The address was not given. I was advised to address him, 'Maker Pulsometer Pumps, Melbourne,' which I did, and have not received a reply. Perhaps I will have it through the Dead Letter Office. Did all manufacturers catalogue and code their wares, as all number them, in cases such as I have mentioned, they could be telegraphed for and landed here in six weeks, independent of agents, who will not trouble to do so."

These complaints, it will be seen, appear to hint that there is something wanting on the part of the Australasian agents for the British firms named.

What is really worthy of being discussed is the question of the interchangeability of machine and implement parts, although we do not anticipate that that system is likely to be carried so far as to cover all the makers of any given article. Take mowers and reapers, for instance. There are numerous patterns of these machines, each having its peculiarity, and each being claimed to possess merits not owned by any of its rivals. It is not easy, consequently, to understand why or how A will derange or alter his machine in its vital points simply in order that the parts of B's machine may interchange with it. Nor, supposing the principle to be admitted, is it easy to settle who shall give way, and who be regarded as having the standard to which all the other makers are to work. At the same time, we are quite of opinion that there are several minor—and some leading—parts of the different kinds of machines and implements which might with advantage be made to standard sizes or dimensions.

### Wanted—An Inventor.

The pita plant of Honduras invites the enterprise of American capital and Yankee invention. Only one thing is needed and the lucky man's fortune is made. Mr. Burchard, our consul, reports that this pita plant, which has never been cultivated, grows spontaneously and in apparently inexhaustible quantities by the margin of every river and lagoon, and, indeed, anywhere below the altitude of two thousand feet. It can be had for the cost of cutting. The fiber is susceptible of a thousand uses. The people of Honduras convert it into thread for sewing boots and shoes, and into nets, fish lines, and cordage. The finest hammocks and most costly are also made of it. The small quantities which have been sent to this market have been manufactured into handkerchiefs, laces, ribbons, false hair, and wigs. The difficulty is to decorticate the plant without rotting or otherwise injuring the fiber. The man who can do that will be able to take fortune at the flood.—*N. Y. Herald*.