Improved Tube Expander.

In making tubular boilers, no part of the work gives more anxiety or requires so much care as fixing the tubes in their places. Since they serve two purposes—for stays and heating surface—being exposed to strains in different directions and to alternations in temperature, it will be apparent that all the work judiciously bestowed upon them is not thrown away.

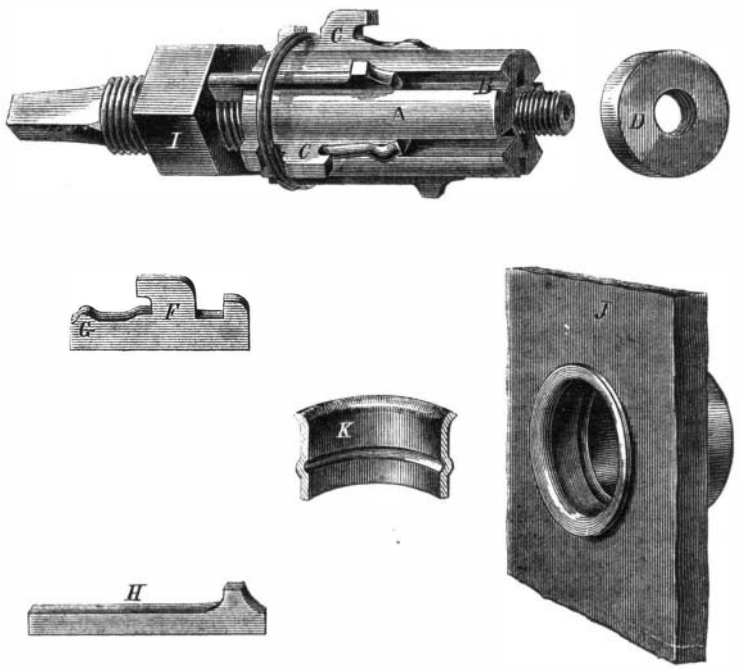
The common method of fastening the tubes is to pass them through the sheet, expand a collar or shoulder inside the same, where the water is, and and then turn the outer ends over in the smoxe-box and fire-box respectively, with the same tool. This work is done by percussion, or blows with a hammer, and many contend that it is an impertect and unsatisfactory method; in proof of which they point to frequent instances where the tubes have blown out, and leakages occurred of greater or less importance. It is also stated that the tubes are often cracked by the reckless use of the hammer.

The present invention does not contemplate the use of the hammer, the tube being fastened by drawing the end or pressing it, as will be shown hereafter. The details are as follows:—

The mandrel, A, has grooves, B, in it, which are inclined planes at the bottom. The tools, C, fit easily so as to slide in these grooves. The front end of the mandrel is provided with a circular nut, D, to prevent the tools from slipping out when not in use. The shoulder, E, inside of the tube is formed by the tool, F, the same having a bead, G, for the purpose. This tool also sets the tube out all round to the sheet, and makes it ready for the expansion tool, H. This tool is made of the right shape, with a shoulder on it, as shown in the engraving, and is used in the same way; that is, the mandrel is put in the tube with the beading tool, F, in it, and a ratchet wrench is then put over the square shank of the mandrel. This keeps the same in the tube at the proper distance from the sheet, and the nut, I, is then screwed down to the end of the tool so that it cannot recede. As the mandrel is turned by the ratchet wrench the tube is expanded, and by screwing up the brace of the wrench the tools are pushed out farther by the inclined planes of the mandrel, so that the shoulder is fully formed. A piece of the flue sheet is shown at J, with part of the tube in it. This engraving was taken from a full sized tube and sheet, and is a perfect representation of the superior quality of the work. A section of the tube is shown at K, which exhibits the depth of the shoulder.

It is claimed that this tool will set a tube tighter in the sheet than any other, and that it makes no difference in its operation whether the holes are round or not. In the samples of work sent the holes are one-sixteenth of an inch untrue, yet the work is very perfect. It answers equally well on large or small, on brass, iron, copper, or steel tubes, and is one of the best tools for the purpose ever made.

A patent was obtained through this office on Aug. 8, 1865, by Robert McConnell. For further information address him Box 401, Jacksonville, Ill. [See advertisement on another page.]



M'CONNELL'S TUBE EXPANDER.

Improved Horse Bit.

Horses acquire vices, or are born with them, as readily as more accountable beings, and they ought to be broken of them as soon as possible.

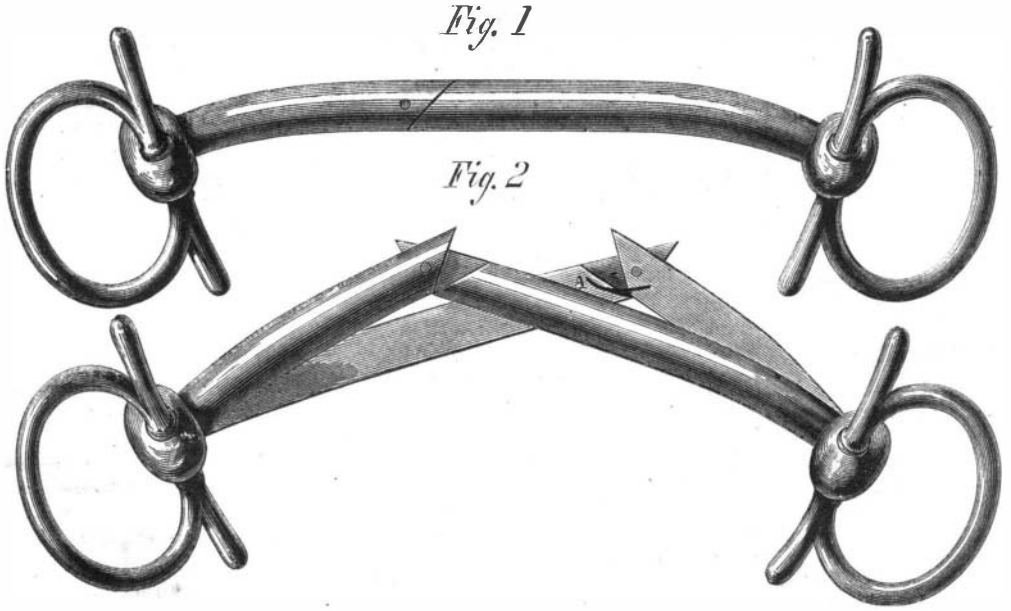
The bit shown in these engravings represents a method of controlling unruly horses by putting them in such pain for the time that they are glad to forget their bad impulses and subside into tractable beasts again.

So long as the animal goes quietly, the bit remains in the ordinary form, as shown in Fig. 1, but any attempt to take it between the teeth and run away, as in rearing and plunging heavily, causes the bit to assume the shape shown in Fig. 2. Here the division in the middle separates by means of a spring between the two parts, and throws the two sections apart, pressing the sharp corners into the mouth and cramping the jaw very forcibly.

The inventor claims that this will subdue the most vicious beast, and will not harm him except on attempting to run away or otherwise misbehave. The whole patent is offered for sale at reasonable rates, as the inventor is not a manufacturer. No offers for less than one State considered. For further particulars address D. B. Baker, Rollersville, Sandusky Co., Ohio.

Fig. 1

Fig. 2



BAKER'S BIT FOR HORSES.

Illustrations for Patent Office Reports.

We have received from Messrs. E. R. Jewett & Co., of Buffalo, N. Y., advanced sheets of the illustrations for the Patent Office Reports for 1864. We have frequently alluded to these beautiful specimens of engravings and can only repeat what we have hitherto said, that they are all that could be desired, and are invaluable to these Reports.

FAIRLIE'S DOUBLE LOCOMOTIVE.

In relation to this engine, particulars of which we gave in our last number under the head of "An English Tank Engine," a foreign cotemporary says:—

"The load she had to draw was a heavy one, and she had some sharp curves to pass round, and some severe gradients to get over, the figure at one point being as much as 1 in 75. With her 350 tuns, however, behind her, she started off in a manner that was beyond all praise, and, with the exception of one pause, the result, we believe, of a little mismanagement, the trial was pronounced on all hands to not only have fulfilled, but to have exceeded, the anticipations which had been formed respecting it. The admirable qualities of the engine cannot be better illustrated than by the remark which a thoroughly practical man, the head of a large firm, subsequently made, to the fact that he did not believe that there was another locomotive engine in England which, upon her first trial, and on the same piece of rail, could have drawn more than two-thirds of the weight which the *Progress* carried behind her."

This is an exceedingly unreasonable statement for any "practical man" to make. This engine has two boilers and four cylinders, 15 inches by 22 inches each, acting on two pairs of drivers at opposite ends of the machine, and is, in fact, nothing but twin locomotives, having double the piston area and double the fire surface of an ordinary engine. Why it should draw more than a common engine is not strange, but why its capacity is only one-third more *is* strange.

Erratic Course of a Bullet.

"At a recent meeting," says the *Surgical Reporter*, "Dr. Sands showed a bullet, removed from a soldier, who had been wounded in June, 1862, in the region of the upper right eye lid. The wound was perfectly healed, when he presented himself at the eye dispensary for some slight trouble experienced in the organ. He had been examined by surgeons in the army, but no bullet had been detected. On close examination, a swelling was discovered behind the ear, which, presenting the features of a hard foreign substance, was cut down upon, and proved to be an ordinary conical rifle projectile. The case was remarkable, as it showed how extensively these projectiles travel, without inflicting serious injury, through, or in the neighborhood of, important parts, or giving rise to much trouble."

"Observer" writing from Gold, Nevada, says the present iron armor for ships of war, is defective, being too stiff and unyielding, and as a consequence the plates and fastenings are broken. He suggests wire rope in place of it. The suggestion is old. Experiments tried at the Washington Navy Yard prove this armor to be one most easily destroyed.