

PRACTICAL DIRECTIONS TO ENGINEERS.

We continue our extracts from King's work on the Steam Engine, published by F. A. Brady, 24 Ann-st. *The Condenser Heats.*

When engines are standing still, it sometimes occurs that the condenser gets so hot, that when it becomes necessary to start again, the pressure has become so great in it, that the injection water will not enter. Leaky steam and exhaust valves will alone cause this, but in no case should it ever be allowed to occur. When an engine begins to get hot, the cracking noise in the condenser, and about the foot valves, will always indicate what is going on, time enough to check it, which can be done by giving a little injection, and causing the engines to make two or three revolutions back and forth. If, however, the engine should become too hot to take the injection water, the only plan will be to blow through, or pump water into the condenser if there be such an arrangement, or to cool the condenser by external application of cold water.

If when under way it is indicated by the gage that the engine is gradually losing its vacuum, apply the hand to the condenser, in order to ascertain if it be getting hot, and if such be found to be the case give a little more injection; but if that does not help the cause, give more still. If the vacuum continues to grow less, the probability is that the injection pipe has become choked; in which event shut off that injection and put on another. Should both the bottom and side become choked, inject from the bilge. Should the bilge injection also be out of order, the engine will have to be stopped, and the snifting valve secured down (if there be one) while the injections are blown through to clear them. Seaweed, and things of that nature, sometimes get over the strainers of injection pipes, preventing the entrance of water.

Most if not all marine engines of modern construction are fitted with a thermometer to the hot well, to ascertain the temperature of the water, which is usually carried from 100° to 115° Fah. This instrument is very important, in order to maintain an even temperature (the sense of touch of the engineer's hand not being delicate enough for that purpose), for it may often occur that there may start small leaks about the condenser and exhaust pipe joints, which would cause a decrease in the vacuum, and, as without the thermometer, the first impulse would be to give more injection, with it we would turn our attention to finding and stopping the leak. This can be done by holding a lighted candle around the joints, and wherever there is a leak the flame will be drawn in. To stop it, mix a little putty, of white and red lead, and apply it to the crevice; the presence of the atmosphere will force it in.

Getting Under Way.

When lying in port, where the steam will not be required for at least four or five days, it is proper that the water should be blown or pumped out of the boilers, and a portion of the man and hand-hole plates removed, to allow a circulation of air. When, therefore, the order is given to get up steam, the first thing is to see that all these plates are put on, and the joints properly made, and this duty should receive the direct superintendence of the engineer having charge of the same; for should any one of them leak badly after the steam is raised, the departure of the ship might be delayed some hours in consequence. After this duty has been properly attended to, open the blow-off cocks and run the water up in the boilers to the proper level, or, if the boilers are so situated that the water will not run up high enough, finish the supply with the hand pumps, wood the furnaces while the water is entering the boiler, and when the proper height of water is attained start the fires. If it be important to raise steam quickly, start the fires as soon as water is discovered in the gages, continuing the supply while the fires are burning. As a small quantity of finely split wood, with a little shavings or oily waste placed in the mouth of the furnaces, is all that is necessary to start the fires, the back part of the furnaces, particularly in boilers with inferior draft, should be covered with a layer of coal to keep out the cold air.

In raising steam it has been the custom to recommend that the valves of the engine be blocked open, so as to allow the heated air from the boilers to pass in and warm up the engine before steam begins to be

generated; but as in many cases this is attended with considerable trouble, and as the advantages to be derived from it are very small, it hardly appears to the author's mind to "pay." The safety or vacuum valve should, however, be kept open until steam begins to form, in order to let the heated air escape. The strain upon boilers being from the inside, they are constructed and braced with the special view of withstanding this strain, many of the braces being entirely useless in sustaining a pressure from without; marine boilers are therefore fitted with a small valve opening inwards, and weighted so as to open and admit air whenever the pressure from within falls to about five pounds per square inch below the atmosphere. These valves are called differently by different parties, as follows: *vacuum valve, air valve, reverse valve, &c.*

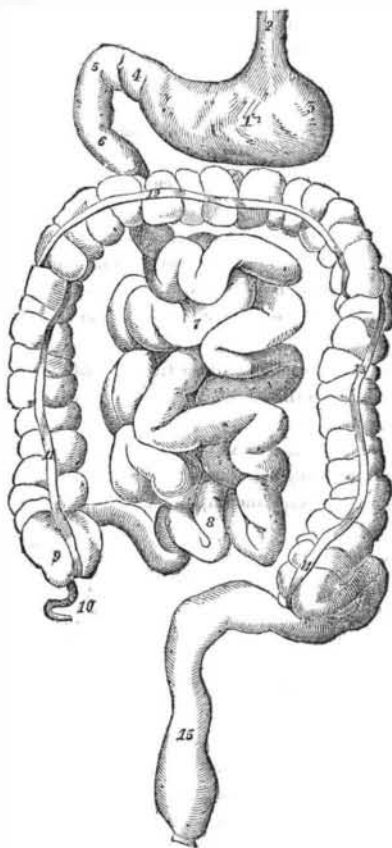
After steam has been raised to 3 or 4 lbs., the engine should then be blown through and warmed up, and after sufficient steam is raised to move the piston, the engine should be turned over two or three times, to see that every thing is right, before reporting ready.

TALK WITH THE BOYS.

NO. 9.—A DISPUTE SETTLED—THE STOMACH AGAIN.

"Father, John and I don't agree about what you said of the bile last week; where is it that it is mixed with the food, and what good does it do?"

"I will get a picture and show you exactly how the food moves through the body. Here is the lower end of the esophagus, which leads down from the mouth into the stomach. When you swallow your food, it passes through this moist, limber pipe and falls into the stomach."



1, Stomach; 2, Esophagus; 3 and 4, Stomach; 5 and 6, Duodenum; 7, Jejunum; 8, Ileum; 9, Caecum; 10, Vermiform Appendix; 11, 12, 13, 14, Colon; 15, Rectum.

"As soon as any food enters the stomach, the gastric juice begins to be secreted, and is mixed with the food. It is found that unless the food is properly mixed with saliva, the digestion is very slow and imperfect, hence the importance of eating slowly."

"Why so?"

"The saliva is secreted by numerous glands in the mouth, called salivary glands, and they act, as a general rule, only while we are chewing our food. But while we are chewing, they are constantly pouring out this peculiar liquid, which is by no means pure water, but which has peculiar and powerful properties, acting upon the food and preparing it to be dissolved by the gastric juice. Therefore, the more slowly we eat, and the more thoroughly we masticate our food, the more perfectly is it mixed with the saliva, and thus the more

perfectly prepared for complete digestion by the stomach. There is no doubt that a great deal of dyspepsia is caused by too rapid eating."

"I have heard that said a good many times, but never understood it before."

"After the food has been mixed with the gastric juice and churned from an hour and a half to five hours in the stomach, and has thus been converted into chyme, it is passed out into the duodenum; here it is, marked 5 and 6, you see, in the cut. It is in the duodenum that the food is mixed with the bile. What the bile does is to change the chyme into chyle. The chyle is a milky liquid. The bile is secreted by the liver. It flows first into a sac called the gall bladder, and then into the duodenum to mix with the chyme and further dissolve it. Sometimes the duct which leads the bile into the duodenum gets choked up, and then the bile is absorbed by the blood and carried all over the system, imparting to the skin and eyes its own yellow color."

"That is the cause of jaundice, is it?"

"Sometimes. But as the liver secretes about two quarts of bile a day, any slight derangement of it is sufficient to give the skin a sallow color. When the bile is thus turned from the duodenum into the blood, of course the digestion is interrupted, and thus indigestion and jaundice are very apt to accompany each other."

"Did you not say something last week about the pancreatic juice?"

"Yes; it is by the action of the bile and the pancreatic juice that the chyme is converted into chyle. The pancreas is what the butchers call 'sweet bread.'"

"Where is it that the food which goes to nourish the system is taken out of the intestines?"

"From the ileum, marked 8, you see, in the cut. It is sucked up into little fine tubes which unite in a larger one that leads up by the side of the back bone and pours the food into a large vein in the left side of neck. The waste matter continues on up the colon, 11, across the body and down 12, 13 and 14, and out of the rectum, 15.

"I understand it now by the aid of this cut, but last week I got no clear idea of it at all."

"I think now you will remember the course of the food, and next week, if nothing new prevents, we will come to the mode in which the fatty parts of the food are burned up and our bodies kept warm."

ENGLISH ROGUES AND THEIR NEW YORK BRETHERN.

According to the judicial statistics of the United Kingdom for 1859, it appears that the number of professional thieves in England and Wales is 39,530; suspicious characters who are constantly under the eyes of the police, 37,633; vagrants, 23,352. Their cost to the public is about one hundred and fifty millions a year. It is related that a gentleman, recently traveling in England, took a lunch at a cheap eating house where the viands were served upon pewter plates screwed to the tables, and provided with knives and forks each secured with a chain. This is a "tall story," and goes to show, if true, that the "professional gentry" are far more numerous and dangerous than they are in this country. It is well known that, except in cases of forgery and embezzlement, few Americans fall into the custody of the police; our pickpockets, burglars, hall thieves, highwaymen, swindlers, and "fancy" generally, are of foreign birth or foreign parentage. They appear to have been educated to their profession, and, like booksellers, have a set of technical terms intelligible only to those familiar with their usages. Many Hebrew and gipsy terms are found in their vocabulary—probably importations from London.

DEATH OF AN INVENTOR.

We learn, by the London *Engineer*, that Mr. J. Condie, of Glasgow, the inventor of the steam hammer illustrated on page 337, Vol. III. (old series), of the *SCIENTIFIC AMERICAN*, died suddenly on the 31st of October last. In company with a friend he had gone into a store to examine a painting, and, while standing at a distance viewing it, he fell backwards, gave two or three convulsive movements, and died without uttering a word. He was a very able engineer, and was respected by all who knew him. At the time of his decease, he was sixty-five years of age.