Machinery and Tools as they are.—The Steam Engine.

(Continued from page 67.)

In every dissertation upon machinery, the subject of first importance to be discussed is the Steam Engine and we shall accordingly begin our remarks upon its present condition, with that powerful auxiliary to man. It is not here the place to descant upon the utility of the Steam Engine, nor write the biography of its improver—James Watt—both are alike appreciated—the Mechanic and his work—both have been the theme for the pen of many distinguished writers, and both will go down to posterity in joined remembrance—the Operative and his labor, the Steam Engine and James Watt.

To give a history of the Steam Engine, through its progressive improvement, would be a subject of interest, but would require a greater extent of space than can be here afforded for it, besides, so many books have been written upon the subject that any such account could be only a repetition of what has been already said. We shall, therefore, omit the usual prefatory remarks, and proceed direct to the subject that we propose to treat upon, namely, the Steam Engine in its present state. This, for the better convenience of perspicuity, we shall classify under three heads, viz., Marine, Land, and Locomotive—a division that is generally employed by the best writers upon the subject.

MARINE ENGINES—In adverting to the Marine Engine, we at present more particularly allude to the species of engine employed in sea-going vessels, which differs considerably from those employed on our rivers and lakes, and even along the sea-coast, as in the instance of the steamboats which traverse Long Island Sound. The form of these last-named engines, although well adapted for tranquil waters, would be found unfitted for the stormy ocean.

The description of engine used for sea-going vessels is generally known by the name of the marine condensing engine. For many years the side-lever engine alone was employed for sea, although modern practice has, for some time past, earnestly sought to introduce a more compact shape. It is, indeed, customary for many to speak of the side-lever engine as a thing of the past, and as being entirely superseded by direct-action engines. A little reflection, however, will show that many of our best vessels are still furnished with machinery of the side-lever description, and although we feel strongly the many defects of this variety of engine, it cannot be denied that several of its substitutes have proved still worse. There are, however, other direct-action engines which are decidedly superior, and we trust that the inventive genius of our countrymen will add still further to the number. A few of the best direct-action engines we intend, briefly to describe, but will first glance at the side-lever engine.

Side-Lever Engine—An engine of this form may be thus briefly described:—On a stout bed-plate is fixed the cylinder, behind which are the condenser and air-pump, all three being ranged one after the other in a line with the length of the vessel. On either side of the cylinder is one of the side-levers, which gives the name to this variety of engines. These levers are, in fact, beams not exactly shaped like those in our river steamers, the proportionate depth being much less, and being also formed in one mass; in fact they approach closely in shape to the beam as made by James Watt. It is said that the side-lever engine owes its origin to a rival of Watt, who, irritated by the praises bestowed on the arrangement as planned by his competitor, boasted that he could turn that arrangement upside down, and yet make the engine work. This he seemingly effected by placing the beam at the foot of the cylinder, in which position it is generally called a side-lever. It is certain that this disposition of the beam is most advantageous for insuring the stability of the vessel, and accordingly, for a long period, it was the only mode employed for sea-going vessels, but when the length of the voyage was extended, and it was requisite to render available all possible space, it was then found that the side-levers occupied far more room than could be afforded. To this defect must be added the great weight of the side-levers or sway-beams (which, however, is much less than formerly, as they are now usually made of wrought-iron), the friction on the main centres on which the beams work, and the strain on the foundation plate. We have mentioned the faults of this engine, but it has an advantage over many of its direct-action competitors, in permitting the use of a long connecting-rod, which is of more importance than may at first sight appear. That a vast field is open for improvements in the marine engine, will be evident when we reflect that a first-class locomotive will exert a power equivalent to one thousand horses, and yet will weigh but 35 tons, including the water in the boiler, thus giving 30 horse-power for each ton of its weight. Now, the side-lever engine, with the flue-boiler in use a few years ago, gave only a force of two horse-power for each ton weight of the engine and boiler. The present direct-action engine, with tubular boilers, gives from four to six horse-power for each ton. This is certainly a great improvement, but the instance of the locomotive cited above, points to further progress, at the same time we must remember that the latter is a high-pressure engine, and, consequently, the addition of a condenser, air-pump, hot well, &c., does not increase the aggregate of its weight. The former vessel has remained nearly the same in construction since its first employment, and offers a wide scope for improvement. To condense the steam rapidly and effectually, is the desideratum to be obtained, and which must be done in the smallest space possible. Some attempts have been made to improve the condenser by fixing a number of tubes within it, thus exposing more surface to the effects of the cold water. This system at one time found great favor, but has fallen into disrepute, owing to the exceeding trouble and consequent expense of keeping the tubes in proper order.

(To be Continued.)

Population of New York State.

The population of New York State, according to the census returns of the year 1852, was, in the aggregate, 3,097,358; of which number 2,439,296 were native born, and 658,062 of foreign birth. Of the former 2,151,196 were born in New York State, 26,352 in Pennsylvania, 35,319 in New Jersey, 66,101 in Connecticut, 13,129 in Rhode Island, 55,773 in Massachusetts, 14,519 in New Hampshire, and the remainder in other States. Of the foreign population 343,111 is Irish, 118,398 German, 84,820 English, 23,418 Scotch, 12,515 French 7,582 Welch, and 47,200 British American. More than two-fifths of the foreigners are located in New York and Brooklyn cities.

[For the Scientific American.]

Table of Lumber in Logs.

In Vol. 5, page 307, you have published a table giving the contents of a log in board measure of 12, of 14, and of 16 feet long, from 12 to 48 inches diameter. In the same volume, on page 322, "M. W. B" corrected the table prepared by "M. J. B.," and gives us a rule for only one length of logs, and asserts it to be a true mathematical one—that he has found it correct by sawing many thousand feet of plank. All this is good as far as it goes, but it is of little use in this country, for we have to saw logs for fence posts of 4 feet length, some 4½ feet; in fact, all lengths, to 27 feet. We have prepared the following table which suits us much better; it may be of use to many of its readers. I copy this from one I prepared for the pages of my volume for the use of operatives.

It is the result of the following formulæ:—Multiply the diameter by 3·1416 for the circumference; multiply the diameter by ·7071068 for the side of the square inscribed in the circumference or circle, this product, squared, gives the area contained in the square, which divided by 6 and multiplied by 12, gives the board measure in one foot of the log; multiply this by the length of the log in feet, the result is the boards from the square of the log. The division by 6 is only for the square of the log, for one-fifth of the log is lost in sawing boards one inch thick.

The first column is the diameter of the log in inches; the second column is the girth or circumference in feet and hundredths; the third column is the area of the end of the log in square feet and hundredths; the fourth column is the side of the square it will make in feet and hundredths; the fifth column is the area of the square in square feet and hundredths; the sixth column is the amount of board measure contained in one foot of length of the square, after the saw-dust is deducted.

Diam.	Circumf	Area of the end	Side of square.	Area of square.	Ft. board measure.
One	Two	Three	Four	Five	Six
9	2·34	·63	·52	·27	2·76
10	2·61	·64	·58	·34	3·48
11	2.87	·66	·64	·42	4·20
12	3·14	·78	·69	·45	4·56
13	3·40	·99	·76	·58	5·80
14	3·89	1·03	·83	·68	6.84
15	3·93	1·22	·87	·75	7·54
16	4·18	1·39	·94	·88	8·83
17	4·49	1·58	1·00	1·00	10·00
18	4·71	1·76	1·06	1·12	11·20
19	4·97	1·96	1·11	1·25	12·50
20	5·21	2·17	1·17	1·38	13·80
21	5·49	2·40	1·23	1·51	15·19
22	5·75	2·63	1·29	1·66	16·60
23	6·01	2·87	1·35	1·82	18·22
24	6·28	3·14	1·41	1·98	19·88
25	6·54	3·40	1·47	2·16	21·60
26	6·79	3·76	1·52	2·32	23·20
27	7·06	3·97	1·59	2·52	25·27
28	7·32	4·26	1·65	2·70	27·06
29	7·58	4·07	1·70	2·89	28·90
30	7·85	4·90	1·76	3·09	30·97
31	8·11	5·22	1·82	3·31	33·12
32	8·37	5·57	1·88	3·53	35·34
33	8·63	5·93	1·94	3·76	37·63
34	8·89	6·29	2·00	4·00	40·00
35	9·15	6·67	2·06	4·24	42·39
36	9·42	7·06	2·12	4·59	45·90
37	9·68	7·45	2·18	4·75	47·52
38	9·84	7·85	2·23	4·97	49·80
39	10·21	8·29	2·29	5·28	52·80
40	10·46	8·71	2:35	5·52	55·22
41	10·71	9·14	2·41	5·80	58·08
42	10·99	9·62	2·47	6·10	61·00
43	11·25	10.07	2.53	6·40	64·00
44	11·51	10·54	2·59	6·70	67·08
45	11·78	11·04	2·65	7·02	70·22
46	12·03	11·53	2·71	7·34	73·44
47	12·29	12.03	2.76	7·64	76·45
48	12·56	12·56	2·82	7·95	79·52
49	12·82	13·07	2·88	8·29	82·94
50	12·98	13·49	2·94	8·64	86·43
51	13.35	14·18	3·00	9·00	90·00
52	13·60	14·73	3·06	9·36	93·63
53	13·86	15·31	3·12	9·73	97·34
54	14·13	15·90	3·18	10·11	101·12
55	14·39	16·46	3·24	10·49	104·97
56	14·65	17·08	3·29	10·82	108·24
57	14·92	17·72	3·35	11·22	112·22
58	15·17	18·33	3·41	11·62	116·28
59	15·43	18·64	3·47	12·08	120·82
60	15·70	19·63	3·53	12·46	124.60

To use the above table, multiply the length of the log in feet by the number in the 6th column, on a line with the diameter in the first column, for the quantity of boards the log will make; but when the log is of more diameter than 2 feet, boards may be sawn after the square of the log. To ascertain the thickness of the slab after the square, subtract the number in the 4th column from the diameter in the 1st column, then divide by 2, and the result is the thickness of the slab. To ascertain the whole contents of the log, multiply the number in the 3rd column by the length of the log, it gives the cubic feet contained in the log; this multiply with the weight of the cubic foot in any table, we have the weight of the log.

We have some logs in our yard 3½ feet and upwards, from 9 to 11 feet long; we work only by the table: What number of feet of boards, one inch thick, will be in a log 3 feet 10 inches diameter and 9½ feet long? Column No. 6, on the line with 46 diameter, we have 73·44×9·5=697·68+313·5=1011·18 ft. of inch boards. The 313·5 can be sawed out of the slabs, they are ·56 foot thick, as follows:—Column 4, we have 2·71—3·833=1·12÷2=·56, from which three boards can be taken of from 14 to 44 inches wide, which makes the above.

JAMES SLOAN.

Sloan's Mills, Floydfork, Shelby Co., Ky.

The New Steamboat Law at the West.

MESSRS. EDITORS—I might write you a long letter about the new Steamboat Law, which has just gone into effect, and which, in one particular, bears pretty heavy upon our high-pressure boats, viz., in the amount or height of steam they are limited to carry; heretofore there has been no limit, and whenever a boat did not wish to be beaten, they would hang extra weight upon the boiler valves. But now that they cannot carry more than 110 lbs. standing weight, or 160 running, it is a very different affair, and I think many of our fastest boats will fall much short of the speed they have made heretofore. I see not how they can help themselves, unless it be by throwing aside their present engines and substituting larger ones, in order to get additional piston surface to make up for the diminished pressure; but then there is a serious objection to that, as the weight of machinery would be too great for the ordinary depth of water in our Western rivers. Many engineers object to the law, but I believe it is mainly because the law objects to them. J. O. CAMPBELL.

Louisville, Ky.

Circular Saws.

RALEIGH, N. C., Nov. 8, 1852.

MESSRS. EDITORS—In No. 1, Vol. 8, of the Scientific American, I see it stated (as I have in previous numbers) that in America five horse-power, is allotted for driving a large rip saw, and a larger circular saw. In this statement there must certainly be some mistake, and such an one as will mislead many persons who are unacquainted with larger circular saws, and particularly in this "Piney Woods" country, in buying steam engines for driving circular saws. A circular saw of 52 inches diameter, and running 4,600 feet per minute at the teeth, cannot be driven in yellow pine timber (with the saw its full depth in the log) with less than 12 horse-power, and not less than a fifteen horse-power engine, should be employed to do the work; I have built and put up in this State some of the best steam saw mills in the United States, and I find nothing less than 12 horse-power will give anything like satisfaction; 4,600 feet per minute is considered by our best sawyers, to be full fast enough (with a half inch feed to the revolution) to do good and profitable sawing. HENRY G. BRUCE.

[When applied to about buying an engine for driving a large circular saw, we have always advised the purchase of a ten horse-power engine. But a nominal five horse-power engine, has been asserted by what was considered good authority—a wholesale manufacturer of machinery—the requisite power. We are much obliged to Mr. Bruce for this definite and practical information.—ED.

Elevating Water from Rivers for Cities.

A correspondent from St. Pauls, Minnesota, which place is situated on the east bank of the Mississippi about 100 feet above the river, states that the current is very strong there, and he wishes to know what is the best way to obtain a large supply of water by raising it from the river. He enquires if it can be raised by the force of the river operating a spiral current wheel, which might work a pump, or by a hydraulic ram. He tells us that this subject is full of interest to a great many cities and villages situated on river localities.

If the velocity of the current was known, and the nature of the banks of the river above the city for a mile or more known, a better judgement could be formed of what machine was best adapted to supply the place with water. A hydraulic ram, perhaps, would answer very well; a steam engine we know, would positively answer, but it may be too expensive.

Filling Teeth over Exposed Nerves.

Dr. S. P. Hullihen, of Wheeling, Va., has discovered a method whereby the cavities of teeth over exposed nerves may be successfully plugged up. It is this:—The diseased parts of the tooth are removed to make it apparent that the nerve is exposed. The fang is then perforated through the gum, into the nerve cavity. The opening should be of about the size of a small knitting needle; its object is to open the blood vessels of the nerve, which will at once be known by the flow of arterial blood. The cavity of the tooth may then be filled without the least fear of pain or ill consequences. This plan has been successfully practiced in a great number of cases. Hitherto a tooth having an exposed nerve could not be filled and prevent pain and toothache.