

## SWEDISH MARINE ENGINES.

Visitors to Stockholm are all familiar with the small passenger steamers which the position of that city enables to be used with so much convenience to the public, and the demand for these boats has led to considerable attention being paid to the design of simple engines for driving them. At the late Vienna Exhibition the well-known Motala Works, of Sweden, exhibited one of these boats—the Motala—which was an excellent specimen of her class, and we give on pages 116 and 117 engravings, from *Engineering*, showing the engines with which she was fitted.

The principal dimensions of the Motala are: Length over all, 56 ft. 6 in.; beam, 11 ft. 8 in.; draught of water with 196 passengers on board, and coal bunkers filled, 4 ft. 2½ in. The engines by which the boat is driven is non-condensing, and is rated at 8 horse power, and is shown by Figs. 1 and 2 of our two-page engraving. It has, as will be seen, a single cylinder, and is fitted with an expansion slide working in a separate valve chest to the ordinary slide.

The supply of steam to the engine is controlled by the butterfly valve, of which we give a detailed view in Figs. 5, 6, and 7, this valve and its casing being formed so that steam can be admitted through the openings *k k* to the expansion valve chest only, or to both the expansion valve chest, and the chest containing the ordinary slide, the opening *l* communicating with the latter. This is a handy arrangement, and enables steam to be admitted for nearly the whole stroke at starting, &c., while by covering the port *l*, the expansion valve is at once brought into action.

Reversing is effected by means of the arrangements shown in detail by Fig. 8. From this it will be seen that the two eccentrics *e f*, are not fixed directly on the crank-shaft, but are formed on the sleeve *d*, this sleeve being held between two collars on the shaft, so that it cannot shift longitudinally. Encircling the sleeve *d* is another sleeve *c*, which has a series of collars turned upon it, these collars engaging with the pinion *b*. By turning the handle *a*, Fig. 2, the pinion *b*, Fig. 8, is made to shift the sleeve *c* longitudinally upon the sleeve *d*. Through the sleeve *d* are cut two spiral slots, shown in Fig. 8, and fitting these slots are blocks *h*, these blocks being carried by the outer sleeve *c*, and their inner ends working in straight grooves cut in the crankshaft. It follows from this arrangement that when the sleeve *c* is shifted longitudinally on *d*, the latter is by the action of the blocks *h* in the spiral slots turned upon the crank-shaft, and the eccentrics are thus shifted from the position for going ahead to that for going astern, or vice versa. The arrangement is not a novel one, but the details are very neatly worked out.

The engine is placed abaft the boiler, and close to it, and the exhaust steam after traversing the belt *g*, enters the feed-water heater *s*, and passes thence through a pipe attached at *r* into the chimney. The feed-water leaves the feed pump by the pipe *o*, traverses a bent pipe inside the heater, and leaves the latter at *p*, whence it is led off to the boiler. The bilge pump is at *u*, and *t t* are hand pumps.

The engine drives a screw 3 ft. 2 in. in diameter, with 6 ft. 9½ in. pitch, and it is supplied with steam at 60 lb. pressure by a boiler of the locomotive type, as shown by the diagram Fig. 9. The dimensions in the letter are in Swedish feet and inches. The principal dimensions in English measures are as follow:

	ft.	in.
Diameter of barrel ... ..	3	1
" tubes ... ..	0	1.95
Length of tubes between tube plates ...	4	2½
Number of tubes ... ..	46	
Length of firebox casing ... ..	2	11
Total heating surface ... ..	120½	sq. ft.
Firegrate surface ... ..	3.8	"

Figs. 3 and 4, on our two-page engraving, show a somewhat differently arranged engine to that above described, this engine, which is also one made at the Motala Works, being intended to be placed aft the boiler, and to give a sufficient distance between the engine and boiler for firing the latter. Both the designs we illustrate are neat and simple, and well adapted for their purpose.

## RAILWAY MATTERS.

It is stated that the largest locomotive in the world is the "Pennsylvania," on the Philadelphia and Reading Railroad. The diameter of the cylinder is 20 inches, the stroke 26 inches, the number of the driving wheels twelve, the diameters of the drivers 4 feet, the weight of the engine alone sixty tons.

THE ST. GORHARD TUNNEL.—It appears from a report made to the Swiss Federal Council, that at the close of June the contractors had completed nearly one-seventh of the whole distance of nine miles, 2213 ft. The progress made during July was about evenly balanced, but the advance on the Goeschenen side was rather more rapid than that effected on the Airolo side.

THE TEA TRADE between New York and China and Japan via the Pacific Railroad continues to be carried on actively. In one day seventeen car loads of teas arrived at New York by this route, in sixteen days and seventeen hours from Yokohama to San Francisco, and less than fourteen days from the latter city by rail, altogether, including delays, less than thirty-four days, being the quickest time yet made between Japan and New York. It can, however, be done in less time if better coal be used in the Pacific steamers.

THE PORT JERVIS (N. Y.) *Gazette* of recent date says:—"At the Erie car shop in this place a record is kept of the wheels removed from cars. To-day four wheels were removed from a freight car which were made, respectively, in the following years: December 24th, 1853; two November 30th, 1853, May 31st, 1854. These wheels have been running over twenty years, have doubtless worn out several cars, and are fit still apparently for as much more wear. Allowing twenty days in each year for standing still, and ten miles an hour while running, they have run 1,697,400 miles."

THE RAILROAD COMMISSIONERS of Massachusetts have been hearing a complaint made by the corporation of Boston, that the citizens are annoyed by the sharp railroad whistle, which in one crossing is sounded more than 300 times a day. The commissioners find that it is questionable whether, in its effect on invalids and horses, such frequent annoying whistling does not occasion a greater loss of life than would ensue from its total suppression. They regard it as "a singular relic of the crude expedients employed in the past," that the companies should disturb whole communities in order to attract the attention of their own servants; and it is suggested that electric signals, and a bell, with flagmen at level-crossings, would answer every purpose, except in the management of freight trains, and as a signal of danger. For this last purpose the value of the whistle, it is remarked, would be greatly increased by abolishing that frequent use of it which leads people to pay little attention to it. The commissioners recommend the change of practice thus indicated.

THE LENGTH OF THE PANAMA line from the Atlantic to the Pacific Ocean is nearly 48 miles; the summit ridge is 287 ft. above the mean tide of the Atlantic. The distance from New York to Hong Kong via Cape Horn is more than 17,000 miles, but by this railroad across the Isthmus it is less than 12,000, a saving of 5500 miles. Starting from Aspinwall (otherwise called Colon), on the Atlantic side, for Panama, on the Pacific, the traveller is soon in the midst of a scene of tropical beauty hardly to be surpassed in the world. Cocoa, palms, and breadfruit trees wave their branches on either side, and from the fastnesses of murky swamps richly-coloured aquatic plants rise in luxuriant wildness. The cries of gorgeously plumaged birds are heard on all sides, and now and then the discordant notes of monkeys, parrots, and other natives of the wood. On the low, muddy banks of streams yellower than the Tiber can be seen the huge unwieldy forms of alligators sunning themselves and awaiting some unlucky object of prey. Almost all the towering trees are clasped in the vice-like embrace of plants of parasitic growth, and many tottering trunks attest the effect of such close companionship. Along the sides of the road and upon the woody banks of the streams passed over are to be seen the thatched habitations of the mongrel specimens of humanity that live on the Isthmus. The rainy season commences in May and lasts until October, and it rains "hot water," according to the statement of residents. The wires of the Isthmus Telegraph Company run alongside the tracks. The dampness of the earth is guarded against by setting the telegraph-poles in concrete. The railroad-ties are made of lignum-vitæ, laid on a stone ballast. The railroad and rolling stock have probably cost 12,000,000 dollars.