A NEW COMPOUND LOCOMOTIVE.

To gain at one step greater simplicity with increased efficiency is invention of the highest order. It is often easier to arrive at results through complexity of parts than to reduce an invention to the fewest and simplest elements.

These truisms find no better illustration than that afforded by the development of the compound locomotive. After the question of economy was settled, there still remained doubts as to its utility, on account of complications arising from the use of auxiliary valves. All objections of this kind have now been disposed of by the invention by Mr. K. Golsdorf, of Germany, of a compound locomotive without starting mechanism. This engine has no moving parts additional to those found on every locomotive. The valve seat is of the ordinary description, with the exception ofa small port in line with the inlet port, but not connected directly therewith, and the valve does not differ from the ordinary slide valve, except in having a central cross bar for covering the small auxiliary port, to which reference has been made. The small ports upon opposite ends of the valve seat are connected with pipes leading to the live steam pipe of the locomotive. When the locomotive is started and steam follows the piston through the greater portion of its stroke, live steam is admitted through the small auxiliary port to the steam chest, whence it flows through the inlet port to the cylinder. When, through the adjustment of the link movement, the throw of the valve is diminished, the supply through the small auxiliary port is cut off by the valve and the bar across the face of the valve, the latter at all times keeping the steam from passing directly to the exhaust port under the valve. The supply of live steam to the low pressure cylinder is regulated so as not to produce undue strain on the moving parts. It is obvious that, in other respects, the engine does not differ from a simple engine.

The first compound locomotive constructed upon this principle was erected in the locomotive shop at Wiener-Neustadt for the Imperial and Royal Austrian State Railway. It completely met the expectations of the builders, and the efficiency and consumption of fuel were so much in favor of this compound engine that further orders were placed. Toward the latter part of 1893 there were eight of these locomotives in service, and early in 1894 there were nineteen. Occasional examinations of the valves of these engines show that the wear is normal, the valve faces being always unexceptional. The auxiliary ports in the valve case of the low pressure cylinder, as well as the rib in the valve, showed that the openings are closed perfectly steam tight at the normal cut-off of about 50 per cent. Compared to ordinary locomotives, the exhaust is considerably softer and there is no conveying of cinders to the smoke box by way of the boiler tubes.

For information in regard to the Golsdorf we are indebted to the Nathan Manufacturing Company, 92 and 94 Liberty Street, New York City.

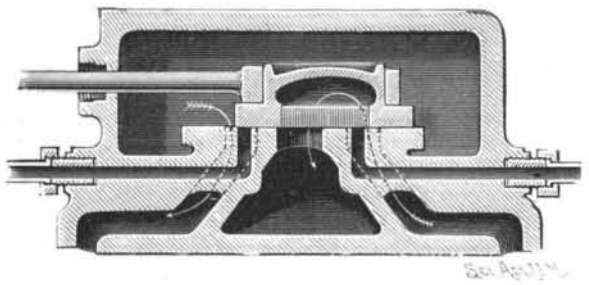

Fig. 2.—ARRANGEMENT OF THE VALVE AND PORTS, LOW PRESSURE CYLINDER.

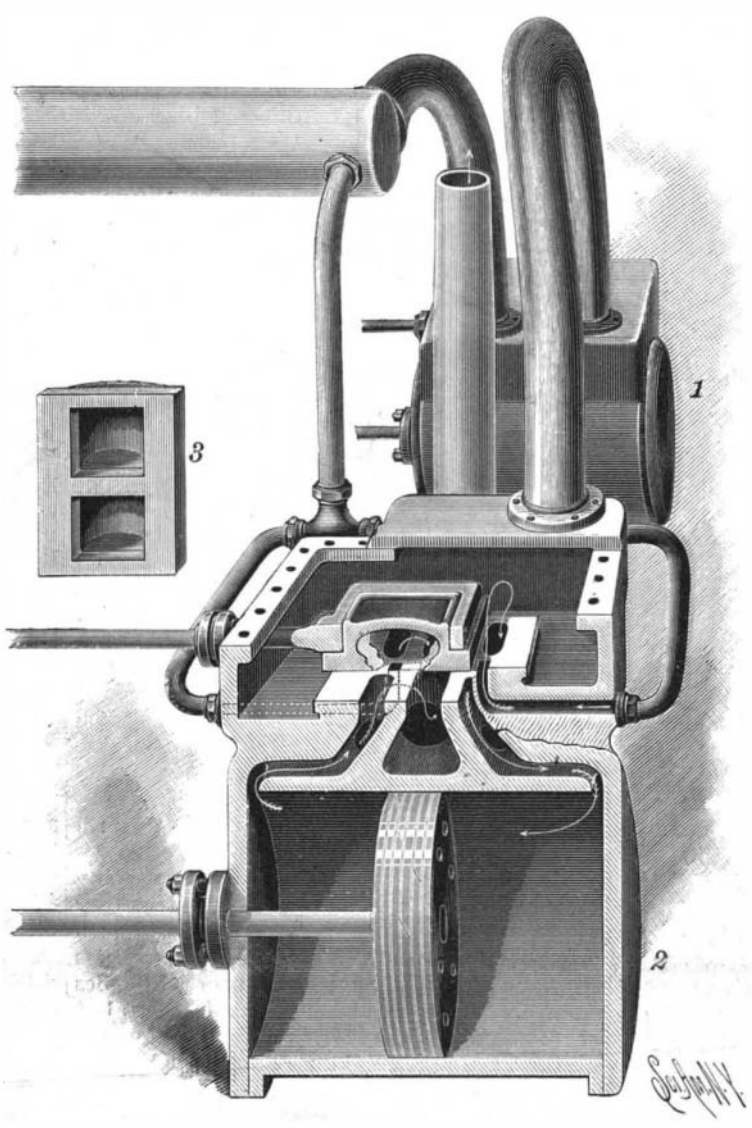

Fig. 3.—LONGITUDINAL SECTION THROUGH VALVE CHEST AND PORTS, LOW PRESSURE CYLINDER.

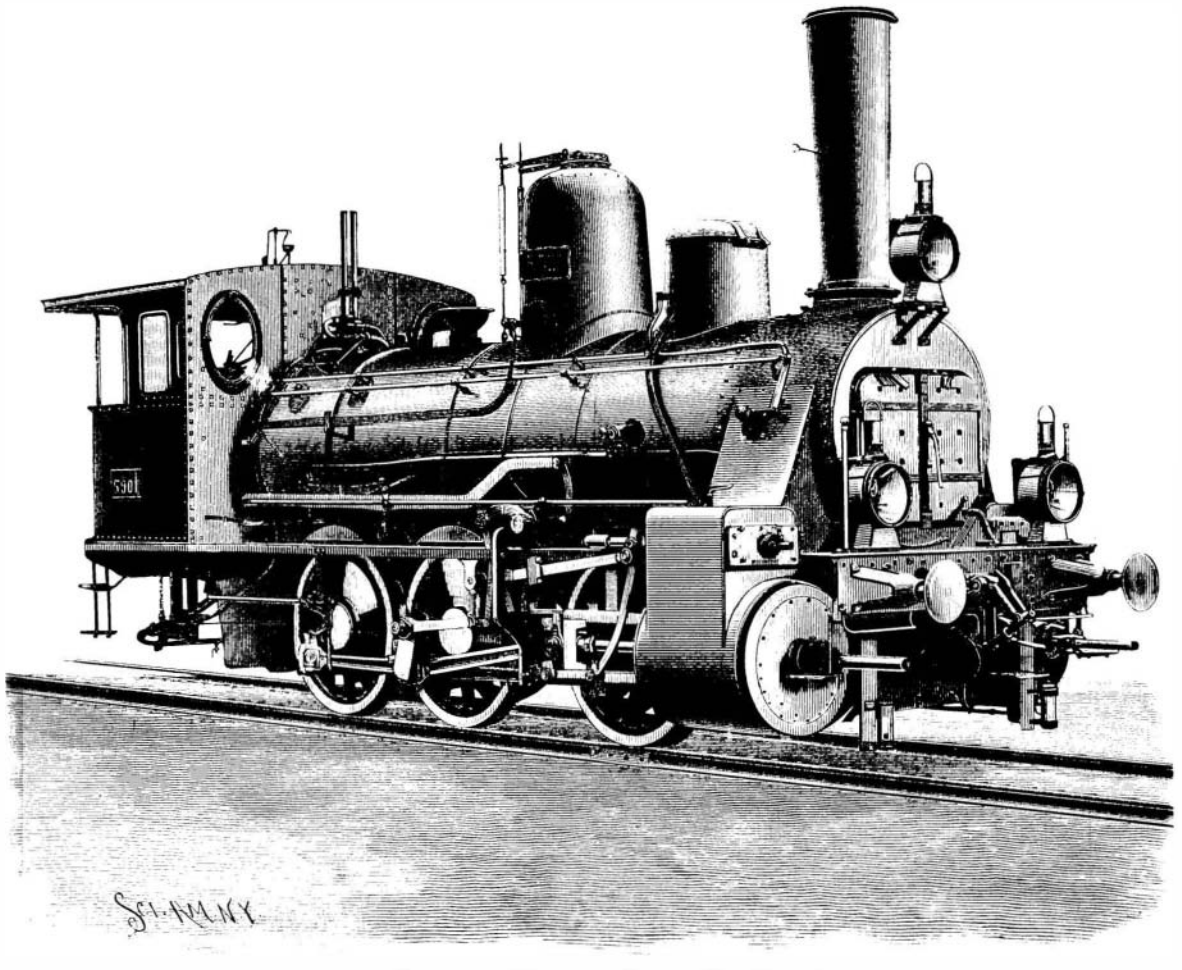

Fig. 1.—GOLSDORF'S COMPOUND LOCOMOTIVE.

Miscellaneous Notes.

Gigantic Leaves.—Palms have the reputation of possessing the largest leaves. Those of the *Quaja* palm of the Amazon measure sometimes 18 feet in length and are almost equally broad. The natives make tents of them. The leaf of the cocoanut is nearly 30 feet long. A single leaf of the parasol magnolia, of Ceylon, may shade fifteen or twenty persons. One of these carried to England measured nearly 35 feet. The largest leaf grown in temperate climates is that of the *Victoria regia*, which is sometimes 7 feet in diameter.

The Dualism of Amphibians.—It has been noticed that certain amphibians have a marked preference for one of the two *media* in which they live. The triton and the salamander, for instance, prefer the air, while the frog chooses one or the other, according to the atmospheric conditions. M. Dessart has found that the aquatic kinds perspire more and respire less than the terrestrial kinds, and he concludes that there is an antagonism between these two functions, by which the *habitat* is finally determined. If an aquatic species is placed in the air, its perspiration is increased and it returns to the water to counteract the excess; while, on the contrary, a terrestrial species placed in the water perceives that its respiration is diminishing and is forced to return to the air to avoid asphyxia.

The Odor of Plants.—*Le Mechan's Monthly* says that among the hundred thousand plants catalogued by botanists only a tenth exhale any odor. Of the fifty species of mignonette officially recognized, one only, that of our gardens, has an odor; and among the hundred varieties of violets, scarcely twelve have the exquisite perfume which we know. In general, the proportion of plants without odor to the fragrant ones is a hundred to one.

Meteors and Stellar Scintillation.—The theory is advanced by S. E. Christian, in *Popular Astronomy*, that stellar scintillation is caused largely by inconceivable numbers of small meteoric bodies, which are constantly passing between the stars and our earth. Momentary occultations of the stars by these bodies, which are revolving outside of our atmosphere, would certainly occur if these bodies were numerous enough, and recent investigation seems to point to the fact that they are.

Flexible Stone.—It may be safely said that no specimen in a geological collection is more curious than the bar of flexible sandstone, which can be bent with less pressure than that required to bend a piece of wet leather of the same size. In an article upon the subject in the *Mineral Collector* we are told that "when a thin slice of the stone is looked at under a lens, by transmitted light, the fragments are seen to be locked together like the parts of a section puzzle toy, fixed, but only loosely. The simplest way of explaining how this stone was formed is to say that the grains of sand were once cemented firmly together by another material, which has been partly dissolved, leaving countless natural ball-and-socket joints of jagged shape behind."

Rice Culture in Madagascar.—The cultivation of rice is highly developed in the interior of the island, but much less along the coast, where the lazy, careless natives find the land more fertile and the temperature more favorable. In some places, as in the neighborhood of Tananarive, immense marshes, subject to annual inundations and the source of malignant fevers, have been transformed into rice fields.

In the mountainous parts the rice fields are in terraces on the slopes of the mountains and the hills or in the high valleys. The water coming upon the high ones, passes successively to each level. There are some remarkable works of this kind, and one often sees these tiers of rice fields raised to the very summit of the high mountains, where the water is conducted by means of little canals, running at the flank of the declivities and bringing the water frequently several kilometers.

Finger-prints as Means of Identification.—Mr. Francis Galton, as the result of his investigation of anthropometry, affirms that "the patterns of the papillary ridges upon the bulbous palmar surfaces of the terminal phalanges of the fingers and thumbs are absolutely unchangeable throughout life, and show in different individuals an infinite variety of forms and peculiarities. And these are the two most important essentials that any method of identification could have. The chance of two finger-prints being identical is less than one in sixty-four thousand millions. If, therefore, two finger-prints are compared and are found to coincide exactly, it is practically certain that they are prints of the same finger of the same person; if they differ, the inference is equally certain that they are made by different fingers."—*Lancet.*

To determine how much coal a bin will hold, calculate 37½ cubic feet to every ton of 2,000 pounds. This rule applies substantially to either soft or hard coal.