

A NEW STEAM ENGINE.

Messrs. Eli James Smith and Benajah Mason, Jr., of North English, Iowa, are the inventors of the novel steam engine herewith illustrated, which was patented through the Scientific American Patent Agency, August 1, 1876. The cylinder consists of two flanged sections, which are bolted to a central partition, C. A valve, *a*, is placed in a slot cut in the head, C, and is pivoted at *b*. D D are pistons, which are placed upon a piston rod, E, the distance between them being a little more than the length of the stroke and the thickness of the central head combined. The valve, *a*, is enlarged above the pivot, *b*, so as to engage with the bosses on the pistons, D D, at the end of every stroke, being moved by each piston in alternation, opening the supply passage, *c*, and the exhaust passage, *d*. The lower end of the valve is continued outside of the cylinder, and formed into a handle at *e*. The cylinder, A, is mounted on suitable supports, and the piston rod, E, is connected with a crank and fly wheel in the ordinary way.

Steam is taken through a pipe, F, and through the open port, forcing the piston away from the central head, the piston remote from the head following, of course, until it strikes the enlarged portion of the valve, throwing the valve over, and allowing the steam to enter on the other side of the central head, forcing the piston toward the end of its stroke. At the same time the lower part of the valve opens the exhaust port, allowing the steam to escape through the passage, *d*. If it is desired to reverse the engine, it is only necessary to move the valve, by means of the handle, *e*, at the proper instant, when steam will be admitted on what was before the exhaust side of the central head. When the engine is made vertical the upper section of the cylinder is made a little larger than the lower one, to compensate for the weight of the pistons.

THE ORIGINAL STEAM STEERING APPARATUS.

It is very rarely that any invention survives a period of half a dozen years without being made the subject of so many improvements and modifications that, in the end, it often happens that little or none of the original device remains. We know of no exception to this rule more remarkable than that of the steam steering apparatus in which steam, for the first time, was used to operate the rudder of a vessel. This machine, in its present form, is practically identical in operation with the first tangible outcome of the inventor's thought. The lapse of 25 years has worked no notable change in its mechanism; and the first apparatus of the kind ever built—an engraving of which as it appears at the Centennial Exposition is given herewith—compares in every way favorably with those of most recent construction, despite the fact that the latter embody mechanical refinements not found in the early model.

The inventor of this device, the importance of which is now recognized the world over, is Mr. Frederick E. Sickels, already one of the most famous of American inventors through his origination of the well known Sickels cut-off. The control of the rudder is secured by operating the valves for the admission of steam to the cylinders by a hand wheel. The rudder is thus compelled to follow the motion of said wheel, which is similar in form and mode of operation to the ordinary helm. Suitable disconnecting and connecting gear is provided, whereby the steam apparatus can be thrown out of action and the helm worked by hand in the usual way.

Apart from its serving as evidence of the non-alteration of the device from its original form, the apparatus at the Exposition is obviously possessed of much historical interest. It was used by negro pilots in the South previous to the war without the slightest failure in its operation; then it was exhibited in the Crystal Palace, in this city, in 1853-4. It was next put aboard the steamer *Augusta*, running between Savannah and Fernandina, on a route extremely difficult of navigation by single engine steamers on account of crooked channels. It was, when thus located, submitted to the severe tests of heavy gales and rough seas, with out any impairment of its efficiency taking place. When the war broke out, the *Augusta* was brought to New York, and the machine was removed and sent to the London International Exhibition of 1862. There it attracted great attention, and a medal was awarded it; and from this time the machine, of which it is the prototype, has gradually been creeping into use.

A model which is exhibited at the Centennial beside the large machine, Mr. Sickels states, is prior in date to any attempt, in books, drawings, or models, to devise a power-steering apparatus. It appears further that Mr.

Sickels first began experimenting upon the subject as early as 1847.

During the present year the invention has been tested by a board of naval officers, and its adoption in the United States naval service strongly recommended. It has already been adopted in the English navy, and is employed on nearly all the British merchant steamers which enter the port of New York. From the owners of these last the inventor receives no royalty, nor do the former in anywise make return for the benefits they enjoy, preferring to avoid

of the time devoted to the examination of the Centennial Exposition, than in making just such studies as this. There are other original machines—notably a model of the first sewing machine made by Saint in the last century, beside Elias Howe's original device—which would form profitable subjects for further examination of the same nature.

A Plea for Inventors.

Of all the mental efforts requiring imaginative construction, none is more difficult than that which is required to develop a new mechanical movement, or originate a new plan-mode or mechanical principle. The faculty of inventing depends more upon natural endowments, or rather instinctive intelligence, than upon education and experience. Experience only serves to familiarize the inventor with the wants or deficiencies in any particular line of industry, and education assists in giving completeness to the conception; but the conception itself is a matter entirely independent of either, and is just as apt to be suggested by an illiterate and inexperienced person as by one who has spent years in studying and investigating the matter: in fact more so, because education and experience are both the results of study and long familiarity with existing devices, so that they, to a certain extent, incapacitate their possessors from looking beyond the boundary of their experience and teaching. Upon the principle that "fools rush in where angels fear to tread," the illiterate inventor will investigate methods and plans which many an experienced artisan or workman would not entertain for a moment, simply because they do not possess that imaginative construction necessary to give the

new creation mental existence, and because their teaching and experience do not include the new idea. Thus many of our most important and most novel inventions have been originated and developed by persons entirely devoid of technical knowledge and experience in the field of mechanics to which their inventions belong. Accident, circumstance, and necessity all contribute to the discovery of new principles. Sometimes, however, we find the skilled and educated mechanic possessed of the inventive faculty, and when this is the case he proves a "world mover." Such was Ericsson, who did more to develop the engine and strengthen the navies of the world than all other inventors combined. Such was Morse, who, with a skill and learning which was admirable in its completeness, adapted and perfected the telegraphic system with such precision and judgment that today it retains the principal features that he gave it. Such were Hoe and Colt, and other inventors whose memories the civilized world hold in reverence.

All patents are not productive, neither are all farms; all men are not rich; all mines are not bonanzas; but if we were to strike a balance sheet we would find that the proportion of the profitable and unprofitable patents correspond in a like ratio with the other profitable and unprofitable enterprises which men undertake.

When we consider the vast number of patented articles in the market, many of which are covered by a number of patents, we will realize that the work of the inventor is very often profitable. There is scarcely an article of human convenience or necessity in the market today, that has not at sometime or other been the subject of a patent, either in whole or in part. The sale of every such article yields the inventor a profit. If we purchase a box of paper collars, a portion of the price goes to the inventor; if we buy a sewing machine, the chances are that we pay a royalty to as many as a dozen or fifteen inventors at once. Indeed the field is so vast and the number of profitable patents so great that it would be far preferable to undertake a recapitulation of those patents which are not profitable than those which are.

The universal sentiment is that genius is its own reward; and in order to give effectiveness to the sentiment, the person who possesses genius in any branch of industry is allowed to set his own price upon the result of his labors. It is therefore but a just recognition of the services of the inventor that he be allowed to provide for his own wants from the benefits which he confers upon the public. The artist who produces a picture of unusual merit can find purchasers for it at a fabulous price. The stage actor who can draw crowded houses can demand and receive for a single performance what would be a year's salary for an ordinary workman; and the lawyer that possesses the faculty of swaying the minds of a jury by his eloquence can demand and receive whatever sum of money he desires for his services; yet the labors of the inventor yield more substantial results, and benefit mankind more than all these combined. He is the sapper and miner who prepares

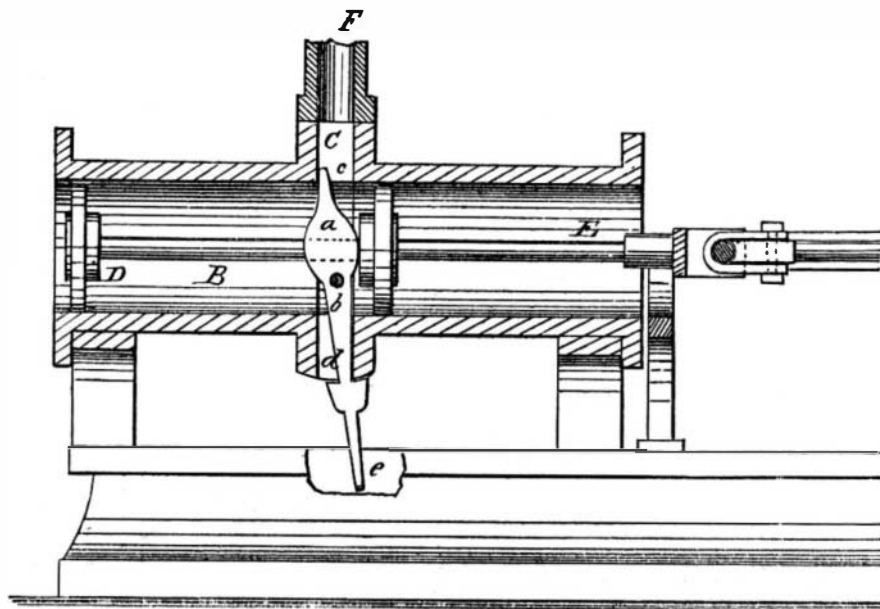
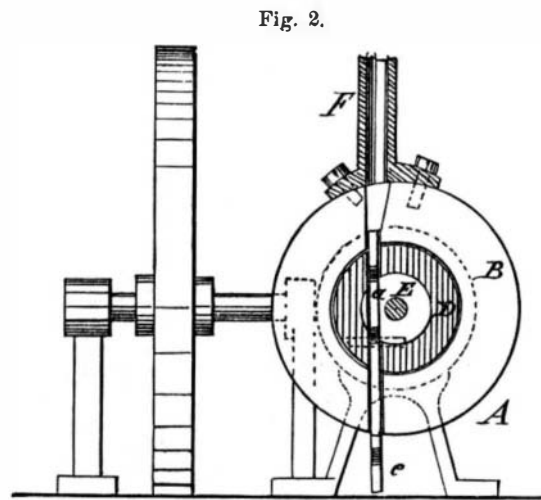
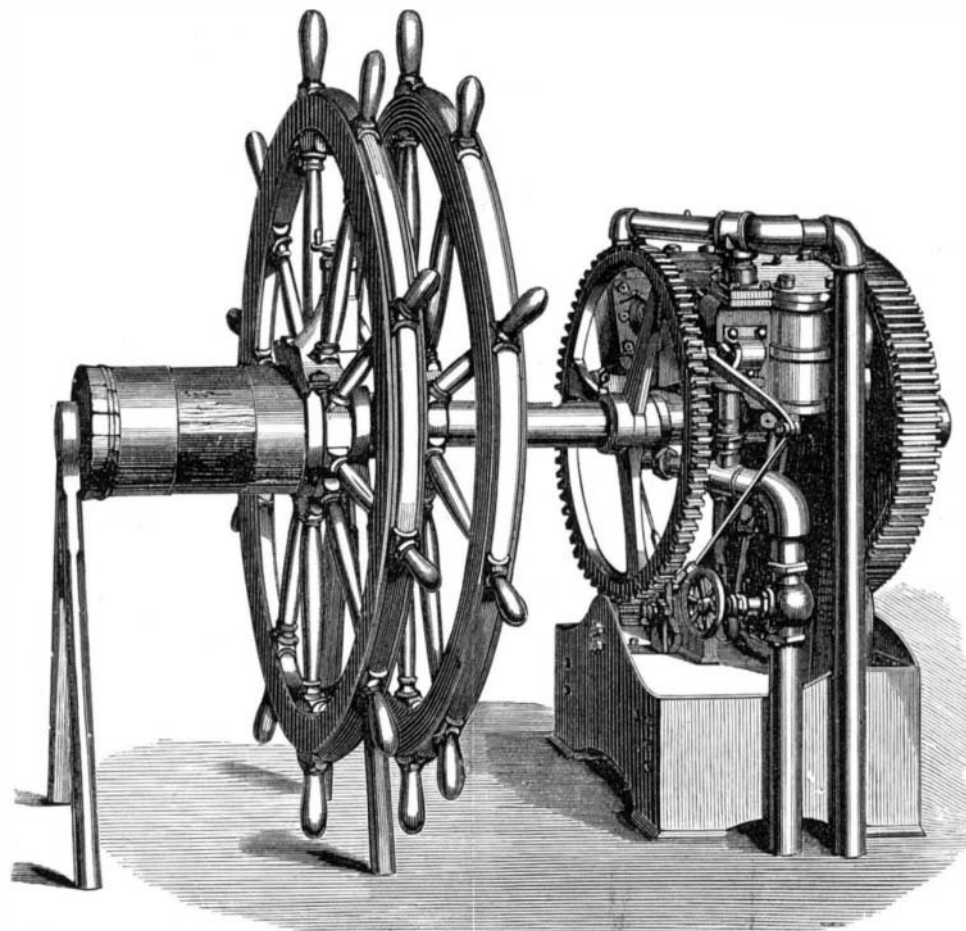


Fig. 1.—SMITH & MASON'S STEAM ENGINE.



doing so by taking advantage of the fact of these vessels being under a foreign flag.

Those visitors to the Centennial, who may make an interesting study of the original machine, will be enabled to judge of the absence of improvements and the perfection of the original model by comparing it with a recently constructed and finely made apparatus of the same description exhibited by the government in the United States building. To the student of the rise and progress of American invention we can suggest no more profitable expenditure, of a part



THE SICKELS STEAM STEERING APPARATUS AT THE EXHIBITION.