

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 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 who 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

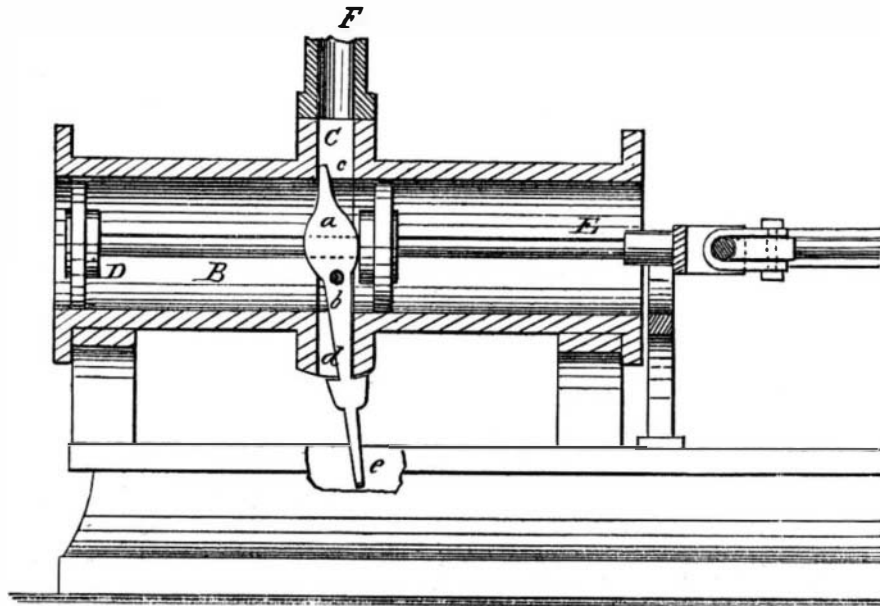
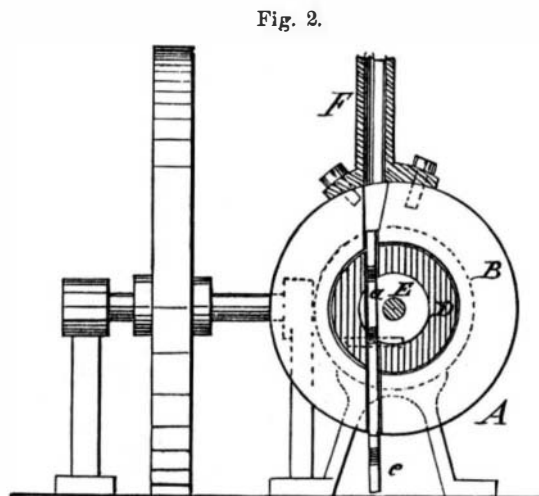
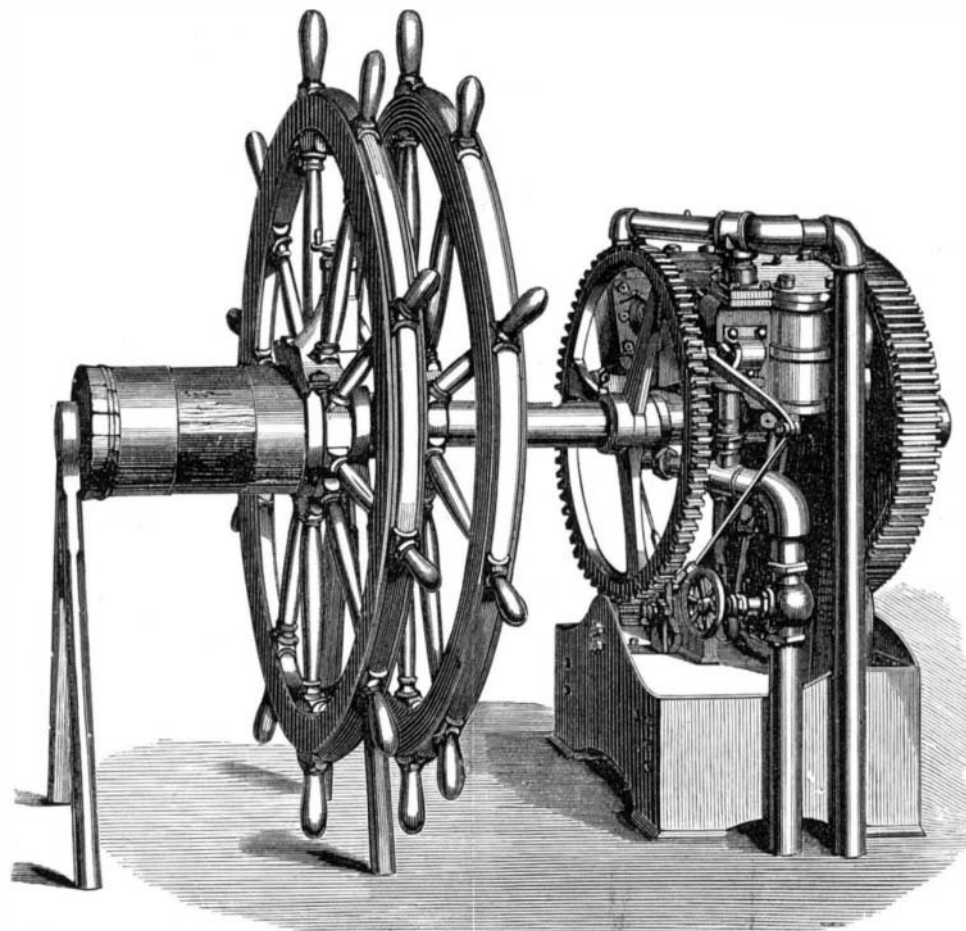


Fig. 1.—SMITH & MASON'S STEAM ENGINE.



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.

the way and overcomes all our mechanical difficulties; in fact, he furnishes us with the honey, while we are the drones in the hive that derive benefit from his labors. Give credit; then, where credit is due. The inventor is the world's benefactor, and as such we take off our hat to him.—*Mining and Scientific Press.*

Oil of Orris Root.

Orris root owes its use during more than two thousand years chiefly to its fragrance, which, curiously enough, does not belong to the living root. Its slight and by no means aromatic smell is first developed into the agreeable perfume after drying, without doubt in consequence of changes of a chemical nature, concerning which at present our knowledge is deficient. When the dried root stock is submitted to distillation with water, eventually there appears upon the water a crystalline odorous matter, which is justly prized in perfumery and is specially prepared by some of the larger distillers. But the yield is very small, only about 1 part per 1000 of the orris root used. The product is of a yellowish brown color, of the consistence of a firm ointment, and possesses the characteristic odor of orris root.

THE HONEY BUZZARD.

The honey buzzard is one of the *falconidae* or hawks, and is known to natural historians both as *falco pernisi* (Cuvier) and *falco apivorus* (Linnæus). It is known throughout Europe; and specimens with a wing measurement of 50 inches are on record, but commonly 20 or 23 inches is the extreme width from tip to tip. The head is always gray, and the eyes, as well as the feet, are yellow. The talons, bill, and cere are black. The plumage on the upper portion of the body is brown; beneath, brown and white mingle indistinctly, while the tail, which is long, is marked with transverse ash-colored bars; the toes are only half feathered. In the female the plumage is similar in color, only very decisively spotted.

The honey buzzard breeds in trees; the eggs are two in number, color gray, with obscure spots. An egg collector came across a nest of one of these birds while in pursuit of his hobby at Selborne, England. In the nest he found but one egg, which was much smaller than that of the *falco apivorus*, not so round, and dotted at each end with small red spots, being surrounded in the center with a broad blood-marked zone.

It must not be supposed that the food of these birds is restricted to honey, which only forms its dessert; but they devote attention to small birds, insects, and reptiles, as well as "rats and mice, and such small deer," and have been known, says a writer in the *Young Fancier's Guide*, from the pages of which we select the engraving, to purloin the eggs of other birds.

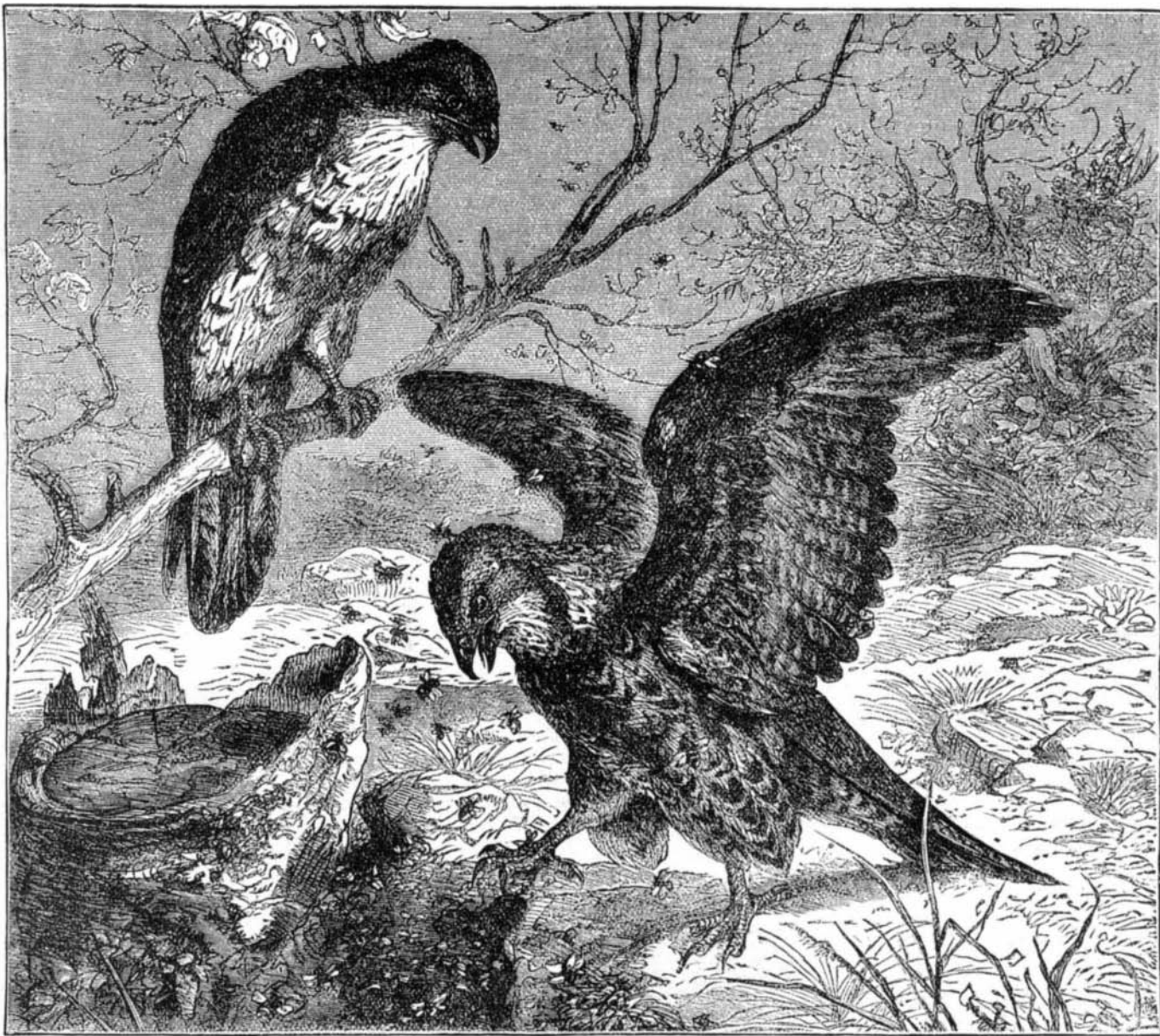
A Curiosity in the Baltimore Record Office.

In the course of the examination of titles in the record office to the ground comprised in Federal Hill Park, which will involve a good deal of labor yet before completion, Mr. Warfield T. Browning (assisting the city examiner, Mr. Hensler) yesterday came upon a deed which excited remark among the persons in the office for some curious matters referred to in it. The paper is a deed of trust in the nature of a will from Dr. John James Giraud, who resided on South street, and owned a part of the Federal Hill ground, conveying all his property to John S. Tyson in trust for the wife, heirs, and legatees, of Dr. Giraud. The deed was executed March 16, 1826, but Dr. Giraud did not die until 1837. Among the legatees was Right Rev. Ambrose Marechal,

Archbishop of Baltimore, for several thousand dollars, and the trustees of the poor of the city and county. Among the bequests are two patents, dated January and April, 1821, to Dr. Giraud for "a discovery in mechanism, consisting of a very simple machine of considerable power, for the use of steamboats and other machinery requiring the application of great power. The patent is termed the handle or cylindrical machine, and the machine carries in itself its fulcrum or point of support." He also bequeaths his right in a discovery of a specific or medicine for the prevention or cure of yellow fever, plague, and malignant and pestilential fevers. The deed says its eminent virtues have been proved by three years of operation and trial by order of the government and medical faculty of Havana. Dr. Giraud's memoir on this subject was published in 1825 by William Wooddy, Baltimore. The specific consists of two liquors, limpid, tasteless, and inodorous; they are neither purgative nor emetic, but recall the secretions through the proper excretories, and the crisis takes place by perspiration, etc.

The composition of the liquors, he says, cannot be discovered by chemical analysis, and their discovery was the result of the study and labors of one third of his lifetime. The government at Havana was to have given him, the deed states, \$120,000 for the discovery; but the commotions in Spain and the death of Governor General Mahy interrupted the negotiations. He says he desires the secret to be sold by the trustees for his heirs to some government, and for that

manner that each of the different parts thereof may be properly proportioned and arranged with reference to the particular function which it is designed to fulfil. When this is done, and the work completed, its useful mission has commenced, and inventive talent or skillful instructors need not be employed upon it, unless it should be to modify or add further improvements. Yet, however complete in itself, or however effectually it may perform its work, it is not endowed with the faculty of self-preservation, and, unless it be properly cared for, will be subject to numberless accidents and injuries, involving not only its own immediate or ultimate destruction, but, in many instances, the loss of life or limb to those employed in its operation. This necessary care requires, not the expert mechanic or professional skill, but simply the exercise of common sense. It is by prompt attention to little things that the maximum efficiency and durability is attained, with properly designed and constructed machinery. When the bearings of shafts and the spindles are not oiled sufficiently, not only does the increased friction require a greater amount of driving power, but the bearings are roughened or destroyed in a proportionate degree. When the caps of journal boxes are left too loose, the journal wobbles, and, if there is gearing attached to the shaft, its teeth are badly worn out of shape; while, if the caps are screwed down too tight, the oil is forced out, the journal heats, and both the shaft and bearing are soon rendered worthless. These matters are of no small moment, and the aggregate loss resulting from inattention to them is very great. It is not confined alone to the machinery of mills and other manufacturing operations, but occurs in a very much greater degree in machinery employed in agriculture. Many a thrasher, horse power, or harvester has been branded of bad construction, and been prematurely disabled, when a few drops of oil, or one or two turns of the wrench, were all that were required to set things to rights. Many other items might be mentioned, in which attention to little details, requiring only an application of ordinary common sense, will guard against great and unnecessary waste of power and damage to machinery; but these are sufficient to illustrate the almost self-evident proposition that, while talent is required to originate, and practical knowledge to construct machinery, its most efficient operation, and the profit in its use resulting therefrom, can only be secured by bringing to bear upon its management the plain, ordinary principles derived from every day observation and experience.



HONEY BUZZARDS AND THEIR PREY.

purpose, for the first time, writes down the composition of the recipe. Should any other person, as is not impossible in this age of science and chicanery, be found possessed of the recipe he is to be treated as a fraud, and the trustee is authorized "to prosecute him with all the rigor of the law." The doctor estimated the amount to be realized from the sale of his patents at \$60,000, and directs that out of that sum \$6,000 shall go to the archbishop and \$3,000 to the poor. His sanguine dreams of profit from this source were not realized, however, no government being found to purchase the patent for the specific; and now the missing ingredient is the money that was expected.—*Baltimore Sun.*

The Care of Machinery no Mystery.

The *Mill Stone*, a monthly journal published at Indianapolis, Ind., one of the many good papers printed in the interest of special trades at the West, gives to its readers the following sound advice on the watchful care necessary in operating machinery:

To correctly plan and devise improvements in machinery involves the exercise of a considerable degree of original genius; and to fully develop such improvements, and to bring them into the most practical shape, requires, in addition to this, the application of acquired knowledge of the construction of the machine or mechanical combination, in such

efficient operation, and the profit in its use resulting therefrom, can only be secured by bringing to bear upon its management the plain, ordinary principles derived from every day observation and experience.

Etching on Glass.

M. E. Seigwart has lately given some interesting particulars about etching upon glass.

Since fluoric preparations have been produced at reasonable prices, the decoration of glass by their means has steadily made its way. Etched glass is now to be found everywhere, and glass etching runs glass cutting very hard. It is very easy to understand that well etched objects appear actually more beautiful than those which have been cut. The cost of production is cheaper; and since M. Hock, a Viennese chemist, has given us an elaborate work upon the technics of glass etching, the difficulties attending this kind of work have been reduced to a minimum.

As is well known, fluoric acid usually etches smooth, while other fluoric preparations yield a matt surface. The most beautiful ornamentation is obtained when certain parts of the glass surface are rendered matt by means of fluoride of ammonium which has been slightly acidified by means of acetic acid. The matt appearance is not always the same with different kinds of glass, but varies much in beauty;