

sewers, and stables. The most available disinfectants for the first, are lime, chloride of lime, or common copperas, either in solution or powder; there is nothing so cheap as copperas which is at the same time efficient. For stables and similar places where the iron stains from copperas might be objectionable, the bisulphite of lime or soda ought to be furnished at a cheap enough rate.

The question of disinfectants involves the old story about cleanliness; "cleanliness is next to godliness." If people understand it, they will find as much virtue in the scrubbing brush, the whitewash brush, and soap and water, as in almost anything else.

#### THE FAILURE OF THE MACHINERY OF THE NEW SCREW FLEET.

The mismanagement of the Chief Engineer of the Navy, to use a mild expression, has long since become proverbial, and the practices of the Bureau is used as a byword in the scientific journals abroad. Some proofs of the incapacity of this man, who has designed the machinery for an entire navy on new-fangled theories of his own, condemning the designs of other engineers, have recently been brought to light which the affidavits of a thousand contractors and "experts" in the interest of the Steam Bureau, cannot cover up or gloss over.

It will be remembered by our readers that Mr. Isherwood caused the engines of the U. S. steamer *Pensacola*, designed by E. N. Dickerson, to be removed and replaced with a pair of his own design, even to the most minute detail. These engines have just been tried, and on the short trip from Baltimore—where they were built—to this port, have proved a complete failure.

On this short trial the cylinders were so cut as to require reboring, the crank-pin journals were ruined by the extraordinary heating and consequent cutting, and the "brasses" had to be transported to the machine shop for reboring. The crank pins are now being filed and scraped as near round as it is possible to get them, by relays of the most expert mechanics the navy yard can command. The main bearings are so cut up that it is quite possible it will be necessary to renew them also.

In short, these new engines, planned by Isherwood for the *Pensacola*, in place of those he caused to be condemned and removed, have proved inefficient.

The *Pensacola*, it should be observed, was propelled to New Orleans, and through the ever-memorable passage of the forts which defended that place, with a pair of "condemned engines," while those which the chief of the Steam Bureau has planned to replace them, cannot propel the ship from Baltimore to New York without having repairs put on them which would disgrace an engine which had seen five years' service. It should also be borne in mind that the naval engines were constructed by Hazlehurst & Co., of Baltimore, one of the most careful and successful marine engine building firms in this country, and their construction in each stage was rigidly inspected by an engineer selected by the very man who planned them. If we were called upon to chronicle the fracture of any particular part, it would be difficult; but the defects of these engines are not due to either workmanship or material, but solely to the ignorance of first principles of the man who planned them. If a connecting rod, a crank shaft, or even the cylinder itself, had been fractured, it could easily be accounted for by defective materials; but when we find that on such a short trial, not only on the principal bearings of the engine are so completely worn out and cut to pieces, as to require renewal, but that the main cylinders themselves have to be rebored at enormous expense and great delay, it is very plain that nothing less than the fact that the design is wrong will explain the matter.

Nearly every rule of screw engine construction, as proved by theory and practice, and adopted by all successful builders in the world, has been violated by him who presides over the steam branch of the navy.

Again, if it was simply one more Isherwood engine which has failed, we should pass it with a mere mention, but when it is remembered that *twenty pairs* of engines, on precisely the same plans as those which have just proved their worthlessness in the *Pensacola*, are now in process of construction for the new screw fleet, in the various engine building establishments on the Atlantic coast, it is quite a different matter;

for it one of these engines, and that one, too, built by one of the oldest and best establishments in the country, under guarantees which Isherwood squeezed into a contract, and the construction superintended by an inspector of Mr. Isherwood's appointing, who examined every detail with microscopic care before it was put in the engine, fails, it amounts to demonstration that the rest will follow suit.

Furthermore, when it is stated that the contractors, experts and engineers bolster up the worthless structures they are pecuniarily interested in—notwithstanding which the engines stubbornly refuse to violate the laws they were built to defy—one may form a tolerably correct idea of the extent of this failure.

So alarmed was the chief of the Steam Bureau at the result in the *Pensacola*, that he posted in hot haste to New York, not only to push forward "without delay," the tinkering-up of the pioneer engine of the new fleet, but further and of greater importance to have the repairs carried on with the utmost secrecy; and he succeeded so well in the latter direction, that although the rejuvenation of his last exploit has been progressing for some time at the navy yard, it was only a day or two since that we had a chance to look at it—and a sorry spectacle it was.

Of course there is no reason to suppose that this engine will operate any better after it has been put again in the same condition that it was in when it started.

The Isherwood engines of the larger sloops of the *Wampanoag* class, in addition to defects peculiar to themselves, possess all the defects of those just alluded to, increased in proportion to their greater size, hence their failure may be expected to be even greater than that of the *Hassaloo* class, of which the Isherwood machine now in the *Pensacola* is an example.

#### PERPETUAL MOTION.

In our last issue we gave a letter and a diagram from a correspondent which illustrated a plan for a perpetually moving machine invented by a person in Vermont. The number of people engaged in chasing this mechanical "will o' the wisp" far outnumbered those sanguine mathematicians who have, or are just about to, "after years of toil" square the circle.

Surely any one, who did not wish to be deceived, could see that the machine alluded to at the beginning of this article was impractical. Six balls connected to levers jointed to the periphery of a fly wheel were so attached to each other by cords, that the centrifugal force of the balls generated in revolving the wheel one way would draw in the other balls on the opposite side and thus cause a preponderance of weight which would turn the wheel continually after it was once started. But, as our correspondent says, the balls did not fall out as they ought to have done, or at the proper time, and the wheel stood still. Undoubtedly there have been many more plausible schemes than this. An industrious German of our acquaintance after working hard for years accumulated quite a handsome sum to buy a home wherein to pass the winter of his days in peace and quietness. Unfortunately he dreamed one night that he had invented a perpetual motion. He acted on this dream. He bought a foot lathe, set it up in his bed room and worked on it in the intervals before and after his daily task by which he earned his living. He was not a poor mechanic by any means, but a man of first rate abilities, and he made a machine so near to a perpetual motion that he thought the next one with a few alterations would be "the long sought after."

He became so engrossed with this impossibility, that he absented himself from the shop and neglected his work so that he lost his place that he had filled for years. If any one asked him how his machine was getting on, he would answer cheerfully. "Oh, first rate, it runs ten hours now; I am going to put on another fly wheel and a pinion, then it will be done."

Fly wheels and pinions he was continually adding; now gearing the speed up, then letting it down, of course adding just so much labor to the main driving force and getting further and further from his ideal.

The machine got so full of fly wheels and pinions at last that he was obliged to shore the floor of the house up lest it should fall into the cellar.

One day the horrid truth came upon him with full force that he was a ruined man; that the more fly wheels he put on the worse he was off, and he fled to that resource of all cowards—rum—and drank himself to a sot.

Those who study this delusion are like travelers lost in the woods. They move in circles, and end where they began.

A force that will generate itself and move another force must be greater than itself; which is contrary to common sense and mathematics.

How many are there at this time floundering on this mechanical "bridge of asses?" How many are there whose minds are full of levers, springs, toggle joints, and balls that only need an impulse to set them in motion to swing through space forever, as the planets swing in their orbits? Not a few; sorrowfully we say not a few, because it is painful to see energies wasted on chimeras when there is so much real work to be done in the world.

#### TAX FOR EQUALIZING BOUNTIES.

The Secretary of the Treasury, in a letter to David A. Wells, Esq., Chairman of the U. S. Revenue Commission, states that the equalization of soldiers' bounties will require an expenditure on the part of the Government of from two hundred to three hundred millions of dollars. The Secretary wishes to know if the resources of the country can bear this additional debt, which will require an additional annual payment of interest of from fifteen to eighteen millions.

Mr. Wells, whose intimate knowledge of the taxable resources of the country is probably superior to that of any other citizen, replies in a very able letter, that, to meet the financial wants of the Government in the present critical period of our experience, and to guard our future prosperity, require that we borrow no more money—that to make this increased debt would require the re-adjustment of the present system of taxation, and the imposition of taxes upon many articles which would seriously affect the interests of the laboring and producing classes.

It is the purpose of the Government to lay a tax, so far as it is possible, upon articles usually regarded as luxuries, and to exempt such as are regarded as necessary for the wants of the people. This is the true theory, and is the one that has hitherto been urged in the *SCIENTIFIC AMERICAN*.

We publish in another column the estimated reduction in the internal revenue taxes, as reported to the House of Representatives.

#### The Locomotive Improved by Practice, not Theory.

Zerah Colburn in his excellent work on the locomotive, now publishing in England, and in this city by John Wiley, 535 Broadway, makes the following sensible remarks:—

It has been a favorite practice with writers upon the locomotive engine to deal with it geometrically and with reference to its dimensions. For the useful purpose of railways, however, even more depends upon the excellence of its structure; and it may be said that the stanchness of the boiler, the hardness of the cylinders and valve faces, the strength of the cylinder fastenings, and the general soundness of the engine as a whole, have really more to do with its successful working than any abstract consideration of "heating surfaces," and many of the quantitative refinements so often insisted upon. Even the geometrical accuracy desirable in the valve gear is important rather from what experience has shown than from any precise demonstrable relation to the motion of steam. To this day successful locomotive engineering owes far more to practice than to theory; and it should never be forgotten that the best proportions of locomotive engines, so far as engineers are agreed upon which are best, have been discovered by practical men, with little or no aid from theory, except in so far as theory may in itself be considered as the generalization of successful practice.

#### Work for Boys.

The *Northern Farmer* gives the following hints which may interest some boys who read the *SCIENTIFIC AMERICAN*. We think, however, that it is a mistake to set boys at work they don't understand, for they often spoil it and get scolded. The fault in such cases lies with those who gave them the work, for the nature of it ought to be explained before hand. This the paragraph below does:—

"Now is the time for you to do something! We