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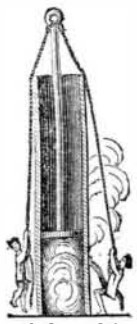
## WORKING STEAM EXPANSIVELY.



SHERWOOD'S work, "Engineering Precedents," which was noticed at length on page 57 of our last volume, and some recent experiments at a large flouring establishment in this city, called the Metropolitan Mills, have caused a lively discussion among a portion of our engineers in regard to the economy of working steam expansively.

The subject has been so thoroughly examined and so ably discussed, that it was generally regarded as entirely settled, and few, if any, of our engineers entertained a doubt that there is great economy in working steam expansively. But as Mr. Isherwood is Chief Engineer of the United States Navy, as his conclusion that there was little, if any, economy in expansion, was derived from a long series of experiments made at the Brooklyn Navy Yard, and as this conclusion has been confirmed by an independent series of experiments at the Metropolitan Mills, a small number of our engineers have adopted the new faith, and have succeeded in getting the whole subject re-opened for fresh examination by the community. The Polytechnic Association of the American Institute have taken it up, and have appointed a committee to report on the value of Isherwood's experiments.

Those of our readers who are familiar with the accounts of the laborious investigations that have been made by Regnault, Rankine, and others, in regard to the generation of heat, the evaporation of water, and the working of steam, are well aware that an exhaustive treatise on the subject would fill whole volumes of our paper. There are, however, a few leading facts which seem to us to be the controlling ones in the case, which may be very briefly stated.

If we take a long, upright cylinder, with a bore equal to a square inch in size, put a cubic inch of water into the lower end, place an air-tight piston over the water, and apply heat, then the following effects will be produced. If the weight and friction of the piston are balanced by a pulley, the piston will remain at rest until the water reaches a temperature of 212°, when the production of steam commences and the piston begins to rise. While the fire is burning long enough to impart 1,000° of heat to the water, the evaporation goes on, pushing up the piston, and raising it, by the time all the water is evaported, 1,700 inches. During this process, the steam and water remain at the temperature of 212°, all the heat that is absorbed being rendered latent.

If we load the piston with a weight of 15 pounds, it will not rise till the water reaches a temperature of 249°, and when the water is all evaporated, the piston will have risen only 850 inches. Again doubling the load, adding 2 more atmospheres of pressure, by placing 30 pounds additional on the piston, requires a temperature of 291° before the commencement of evaporation, and the weight is raised only 425 inches in hight; the larger weight being raised to a less hight, and the amount of work accomplished by the same heat being equal in the several cases. The fact which has been regarded as settling the question of the theoretical value of expansion is plain from the above statement, When steam has raised a load of 45 pounds 425 inches, if 30 pounds is taken off, it will raise the remaining 15 pounds 425 inches higher, and this last work, which is performed by expansion, is a clear gain over that which would be done by the same heat, if the steam were discharged under full pressure, that is, worked without expansion.

This relation of heat, steam and work which has been proved by numerous and careful experiments, is confirmed by the general experience of engineers in the practical running of steam engines. There can be no doubt that a minute examination of all the details of the experiments at the Metropolitan Mills and of those made by Mr. Isherwood, would reveal the cause of their differing in result from all others. That the Navy Yard engine was a very imperfect one is proved by the fact that it consumed from 11 to 14 pounds of coal per horse power per hour, while engines have been made that run with a consumption of less than 2 pounds. We think it will require more nicely conducted experiments than those which have been recently made in New York and Brooklyn, to weaken the great mass of accumulated proof that there is economy in working steam expansively.

## THE RIGHTS OP JOINT PATENTEES—A REVIEWER REVIEWED.

We have in two previous numbers, (at page 42 and 121 of the present volume) stated some difficulties connected with this subject, and endeavored to solve those difficulties as far as we felt confident of being correct. When we entertained doubts we have frankly confessed them, in the hope that some abler pen would come to the rescue.

One of our cotemporaries, the *Practical Mechanic*, has kindly undertaken this office, and with a confidence indicative of a consciousness of completely understanding the entire subject, has gone on, not only to explain the difficulties, but to smile at the doubts suggested in our previous articles. While we are disposed to take the *will* for the *deed*, and to return our acknowledgments to our cotemporary for its kindness in coming to our relief, as cordially as though we could feel fully profited by its instructions, we cannot but suspect that its confidence of tone is not altogether the offspring of knowledge, but rather of the want of information on the subject. Freedom from doubt is as often the result of not understanding a difficulty, as it is of a consciousness of having met and fully overcome it.

In one of our previous articles we had made the statement that unless an inventor had parted with his entire interest, the patent must issue in his own name. This is stated by our cotemporary to be "more palpably erroneous because entirely false in fact." The reason thus given by it is certainly sufficient if correct. Let us see whether this is so.

We did not mean in what we have stated on this subject, that a patent could under no circumstances issue to the inventor jointly with other persons. He may assign the whole invention to a company in which he is a stockholder, or to a firm of which he is a partner, or he may make an assignment to himself and one or more others as joint owners, and the patent will issue accordingly. In all these cases the assignees of the *entire* interest although the inventor is included among them will be entitled to the patent. But in that case the inventor holds, not as inventor, but as assignee. The assignees hold the entire interest. Our language we presume was not misunderstood, but for greater certainty we thought proper thus to define our position more accurately.

Our cotemporary, among other valuable matter, informs us in its last number, that it is the uniform practice of the Patent Office, "when the patentee (we suppose it means inventor) assigns *half or any portion* of his patent (it should be invention) to some friend who is to advance money in the matter, or for some other reason—the application and specification are made out and sworn to by the inventor, who in the assignment makes request that the patent may issue to both. The assignment is sent to the Patent Office for record, with the application, reciting that the assignee is the inventor, &c., and the patent issues to both. It is difficult to believe that many patents have not been issued in this way under the agency of the SCIENTIFIC AMERICAN."

This certainly is a very curious paragraph, and bears evidence of having been written by one who, at least, esteems himself thoroughly conversant with the subject. The writer, however, may find some trouble to make others, who are familiar with it, believe what he states. It may be difficult for him to believe that patents have not been issued in this way, but it may be more difficult for him to find a single one ever so issued, and what he means by "*reciting that the assignee is the inventor, &c.,*" is to us a complexity.

It also states that the weekly patent list shows that many patents have in this way been issued under the Scientific American Patent Agency. If so, we are wholly ignorant of the fact.

As far as our information extends (and we always try to understand our own business), no patent is ever issued by the office to an assignee until the entire interest has been assigned to him. The Attorney-General of the United States gave an opinion to that effect some years ago, and the rule has, as we believe, been invariably followed by the Patent Office ever since. So that if A makes an invention and assigns one-half to B, and then applies for a patent, requesting the office to issue the patent to himself and B jointly, the request will not be granted. To obtain a joint patent, in such a case, A must assign the invention to himself and to B jointly; A and B being then the joint assignees of the entire interest will receive a joint patent. The reason of this is that none but the assignees of the entire interest will be entitled to the patent instead of the inventor himself. If he has assigned his whole invention partly to one person and partly to another—by separate and independent assignments—or if he has assigned a portion of his invention to one or more persons, retaining only a part, however small, to himself, the patent will, as we understand, always be issued to him alone, and the title will afterwards flow from him in the proper channel.

This construction of the law has been adopted by the present Attorney-General of the United States in a case which arose in the office less than a year since. One Wilson Ager had invented a machine for hulling and cleaning rice, and had assigned his invention to Wolf & Jordan, of the city of Philadelphia. The assignment was somewhat vague, and admitted of two constructions. By one of these it was complete, and embraced the whole United States; by the other, the city of New York, and perhaps some other small fraction of territory would be reserved to the inventor.

The assignees applied to have the patent issued to them at once. The Commissioner adopting the latter of the two constructions above-stated, declined to comply with this request, but finally consented to refer the question to the Attorney General, who, after much hesitation and examination, finally concluded that the assignment embraced the whole United States, and recommended that the patent be issued to the assignees, which was accordingly done. Our cotemporary is wholly unconscious of any difficulty in a matter which called into requisition all the legal acumen of the highest law officer of the goverment, and one of the ablest lawyers known in this or any other country.

However much, therefore, we may be disposed to respect the opinions of our cotemporary, especially when expressed with such apparent consciousness of infallibility as runs through the several articles with which it has favored us, we hope to be excused if, on this occasion, we do not feel justified in availing ourselves of the information which it seeks, so kindly, to impart.

In our previous article, on page 121, we had alluded to a difficulty which might arise in regard to the re-issue of a patent which had been partially assigned. Our cotemporary, with its accustomed promptness, conclusively disposes of this difficulty by calling our notions absurd. We are told that, in such cases, the assignee can obtain a re-issue with the same facility as the original patentee. We certainly should have been better satisfied if we had, at the same time, been informed of the process by which this result was to have been produced, but that seems to have formed no part of the plan of our cotemporary.

For instance: A patentee assigns a fraction of his patent. The assignee, satisfied that it is not in the proper shape, desires to have it re-issued. How is he to proceed? Our critic will tell us that he must apply to the Commissioner of Patents, in accordance with the 13th section of the act of 1836; but how can he do this? That section renders it necessary that, before a re-issue can be obtained, the original patent must be surrendered up. How can the assignee surrender what he neither