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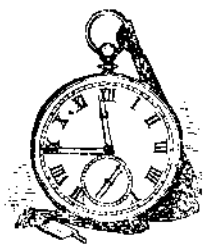
WATCH MANUFACTURE.



OUR fame as a clock-making nation is world-wide, for where can we travel—in Africa, Australia, India or China—that a Yankee clock is not to be found, reminding the inhabitants of "the land of steady habits." With regard to the manufacture of watches, we have also begun to do something creditable; still it is well-known that the *works* of nearly all the watches sold in the United States are imported from abroad. The manufacture of cases for them is carried on extensively in a few places, but they are only lids to foreign mechanism, while a great number of watches are imported entire. We are informed, upon reliable authority, that five times more watches are sold annually in North America, than in any other portion of the globe containing the same number of inhabitants. We ought therefore to be a punctual people, since we are so careful in our observations of "fleeting time." In 1857—before the "panic"—we imported watches and their works to the value of $3,271,000; in 1858, the importation was valued at $2,207,000, but since that period this business has been very dull.

A very useful little book on this subject has lately been produced by H. F. Piaget, of this city, a practical watch maker of 40 years' experience. He commenced his efforts at fabricating watchwork in Switzerland, when he was only seven years old; he also made watches in London for several years and has followed the same craft for a considerable time in America, so that he can speak authoritatively on the subject. The whole operations of a watch are dependent upon the retractile elastic force of a coiled steel spring—that is its moving power. The operation of moving the hands on the dial regularly, to measure time are due to divices which control the coiled spring so as to permit it to "run down," with regularity. A train of small wheels, gearing into one another, receives motion from one wheel on the spindle of the main spring; and this gives the requisite number of revolutions to the time hands on the dial. A watch is a very simple machine, so far as it relates to the *principles* of its operation; but the construction of its parts and their arrangement call forth the highest exercise of mechanical skill.

The above-named author says that the English were really the first successful manufacturers of watches, and that "all the escapements applied to good ones, whether at home or abroad, were invented by them." The best of these are jeweled with rubies, the art of boring which (for pivot holes) was discoved by M. Fazio, of Geneva, in 1790. He could not get his invention adopted in Paris, however; so he then went to London where he was well received. Rubies are the hardest stones which can be drilled, and are therefore the best for pivots; but garnets and various other crystals are used for the more common sort of watches; the English and American ones have generally a diamond jewel set over the upper part of the balance.

The Swiss are the largest manufactures of watches in the world, and all the cheap showy varieties which are seen in jewelers' windows are principally of their manufacture. From recent statistics which we have examined the making of watches gives employment to 36,000 workmen in the Alpine Republic. England and Switzerland are the only countries which export their timekeepers to any great extent; those which come from the former are the most accurate in their movements; those from the latter are the neatest and cheapest, yet some of the Swiss watches have also a very high reputation as being accurate time-keepers. One of the very best and finely finished that ever M. Piaget saw had been made at Geneva, and was sent to California. The plates and bars for the wheels were of nickel, the wheels were of gold, it had a compensation ballance, an isochronal hair spring, and anchor escapement.

The opinion of an experienced and skilled artasan, as to the character of our American-made watches, is of great value. We are told by M. Piaget that "the American watch recommends itself for simplicity of construction, and it will be continually *improving* if the manufacture remains in the hands of persons who will make it of good quality without regard to the price." This is timely and appropriate advice; it is an injunction to strive for excellence rather than cheapness in such articles. The advice is particularly good, at this time, because very great efforts have of late years been made to produce cheap rather than good watches. When we consider that this country affords such an extensive market for foreign watches, it certainly opens a large field for those of domestic manufacture if they can be produced of equal quality at the same prices. This is a question for our people to solve. They have the natural mechanical genius to invent, and with patience and application they will finally succeed in this and in many other important branches of manufacture.

INDIA-RUBBER STRETCHED OUT AT LAST!

It is announced that Horace H. Day, the man who has so thoroughly stretched india-rubber thorough every phase of legal elasticity, has at last concluded to retire to the abodes of peace and happiness. No other man is so well known, in connection with the tortuous windings of rubber litigation, as Mr. Day; and what he does not know about this pliable article, and the law as applied to it, is scarcely worth knowing. He has proved himself a most obstinate and determined opponent, and when William Judson came into collision with him, then was verified the well-known saying:—

"When Greek meets Greek,
Then comes the tug of war!"

Mr. Day has sold out all his india-rubber patents, his factory estate at New Brunswick, N. J., and most of his goods, for a sum exceeding $500,000. The purchasers are William Judson, Conrad Poppenhusen and others, who have organized a new company with a capital of $600,000. All legal quarrels between the parties have ceased, and they have doubtless smoked the "pipe of peace" and buried "the hatchet of war" forever. We regard this result as most extraordinary, and feel somewhat amazed for the moment, as it looks just as though there was "an end to india-rubber," after all that has been said to the contrary. A few days ago we met Mr. Day dashing along the avenues of the Central Park, drawn by a splendid span of bays, in a style worthy of a prince; and not far behind him was his great competitor, William Judson—once enemies, now friends. We look upon this harmonious blending of antagonisms as one important step towards the millennium. Although lawyers may weep, we rejoice to see these gladiators bow down before the goddess *Concordia;* and we advise that each of these champions of caoutchouc be presented with a *belt* by the New York Belting and Packing Company.

FRIENDS OF THE SCIENTIFIC AMERICAN!—Do not forget that the next number closes this volume. Nearly 10,000 subscriptions expire at this time, but we confidently expect that they will be all renewed, and not only this, but that all our subscribers will add to our subscription list by sending new names with their own. We have never appealed in vain to our readers; and every year re-assures us that the SCIENTIFIC AMERICAN has a host of substantial friends in every State of the Union. We hope to have before the first of September, a circulation numbering at least 40,000 copies. The SCIENTIFIC AMERICAN is sold largely by local agents, and its friends can aid its circulation very materially by getting their neighbors to take it from the agent. According to a long-established rule (which is inflexibly applied to all), we discontinue sending the paper when the subscription expires; subscribers are thus protected against receiving a paper whenever they do not want it continued. It should also be borne in mind that we do not employ traveling agents; we prefer to rely upon the true friends of the paper.

THE ANATOMY OF THE STEAM ENGINE.

It is not essential to the caption of this article or to our present purpose to enter upon a review of the steam engine constructed through so many years as have elapsed since its invention, or through what slow, though steadily advancing steps, from a rough and imperfect machine, it has become the very king of all motors. The rather do we remark upon the imperfections which still exist, and treat upon their removal. These faults are confined to no one section of the country, but prevail in a greater or less degree everywhere—they prevent the engine from reaching its proper sphere, and from exercising that power which the area of its piston would legitimately give it.

Every machinist and engineer is well aware of the advantage to be derived from close-fitting boxes (where they should be so) and from surfaces "out of wind," and the like technicalities; and knowing it as they do, it is injurious to the reputation of any concern to allow its work to go from it in a careless and slovenly manner. It has come within our province to remark many times upon the want of *practical* knowledge displayed in the manufacturing of engines, both as respects the convenience of the design and the proper proportions of the same. If we take the matter of metallic packing for pistons, as generally made, we shall find that, even in cylinders of so small diameter as 12 or 15 inches, the two thicknesses of metal that comprise both the inner and outer rings amount (with but few exceptions) to one inch and an eighth. Now, we would ask where the steel spring is which will set these rings out to the cylinder as they wear, or in fact, what mechanical device or process will do it? It is, of course, easy to do it by set screws and springs, but packing so made is not properly constructed, if it be only from the very large margin it leaves for ignorance and recklessness to damage a great deal of property. In our largest ocean steamers the rings seldom exceed half an inch in thickness (separately), and the packing is insured absolutely steam-tight by springs not over 3-16ths at the middle, and swaged down to an edge at the ends—this in cylinders of six and seven feet in diameter. By what argument, therefore, can we reconcile ourselves to the use of packing in a cylinder which would be suitable for one ten times its size? These are common faults, and we have seen many weary hours of labor expended in efforts to make these clumsy pistons steam-tight. We assert that in engines of from six to two hundred horse-power, the rings do not require to be one-half their present thickness, in their relation to fuel, the wear and tear of material and in a per-centum upon the duty done by the engine. All these enter into the account. It would certainly lessen the weight of the piston, which, in a horizontal engine, being always resting on the bottom, is a matter of no small moment. A piston which cannot be made steam-tight by *shoving* in the springs, not driving, is a faulty one, and absorbs power and works to a disadvantage.

In the slide valve, which is the very heart and center of the giant's system, there is the same want of practical knowledge displayed. In too many instances we find a mere nothing in respect to *lead* and *lap*, and a choking of the exhaust ports, which makes it a matter of wonder how the engine ever gets past its center. Let us take any ordinary valve and continue the width of its face across it by means of a square, and afterward mark them outside with a center punch; if we perform the same operation with respect to the ports of the cylinder, and having done so, return the valve to its seat and set it with the proper lead (which differs in different work), we shall find that, in numberless cases, the exhaust does not open until the piston has commenced its return stroke some inch or more, thereby causing compression of steam and a needless obstruction and resistance. It is the practice with many engineers to delay the closing of the exhaust till the latest possible moment, in order to retain sufficient steam to fill the ports and waste passages. We regard this as a hobby, and not sustained by proof of value. Moreover, the exhaust steam does not wait to be punched out by the piston in a properly-made valve, but releases itself through the slightest opening, leaving the piston in a comparative vacuum. If this were not the case, instead of the present puff, we should have a long wheezy sound. It is a very easy matter to put a sliding cover on two ports, so that they shall open and close alternately; but a valve which shall work with economy to the engine, requires careful study. Also in respect to