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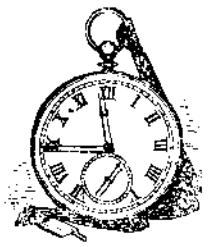
NEW YORK, SATURDAY, JUNE 16, 1860.

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

weight and unnecessary width of surface, many ar. wanting. With the different forms of regulator in use, where so many are excellent, it is invidious to particularize; but in the old-fashioned two-ball governor, which many yet adhere to, there are details which seem trivial and yet are not so. If we look at it, we find in all six joints and pins, whose friction is to be overcome before the valve can be moved. Suppose the machine in operation and these arms revolving, we find that the weight of the balls and the resistance of the atmosphere are continually throwing the faces of the joints against each other, and, in a word, doing all it can to jam them fast. All these joints and pins are fitted tight; consequently, from the very motion of the thing, the apparatus is half the time inoperative. The motion of the arms which move the sliding collar on the shaft is not at right angles and direct, but diagonal, and consequently slow. A properly constructed governor, according to our theory, consists of but four joints; these have no faces, but swing on hardened steel centers, whereby the friction is reduced to the lowest possible point. The arms are at right angles with the shaft, the balls hang vertically and the action of the centrifugal force is positive. With such a governor the speed can be maintained to a nicety, on account of its lessened friction, the extreme sensitiveness with which it acts and the correct principles involved in its construction. This detail of an engine, from its duty, requires to be as delicately made as possible, or else we shall find the engine varying in speed every minute. And we submit that if an engine, or any machine, be worth making at all, it is worth doing as well as the resources of the age will admit. Absolute accuracy goes far to insure perfection, where the general details and design of an engine or machine are faulty · and it is a source of pride to a maker when he can point to the product of his skill and capital, and say that the cost of repair, considered by the amount of duty done, has been infinitessimal.

WEEKLY SUMMARY OF INVENTIONS.

SILVERING LEAD TUBING.

Many attempts have been hitherto made to silver the interior of lead and other tubing employed in mineral water apparatus and for other purposes, by the voltaic process, but it has hitherto been found impossible to effect a uniform deposition of the silver throughout the whole length, or even to obtain any deposition beyond a short distance from the ends of the tubing. The object of this invention is to obtain by such process a uniform deposition of the silver on every part of the interior of a piece of tubing of any length, and to this end the invention consists in the employment as the bath or decomposition cell of the tube itself; also in the use, for the purpose of conducting the galvanic current and for replenishing the supply of the coating metal, of a rod or wire passing through the tube in the direction of its length; also in the extension or stretching of the tube and central conductor by means of screw threads and nuts, or their equivalents attached to their ends, for the purpose of keeping them straight, and thereby providing for the more ready insertion of the central conductor within the tube, and for the prevention of metallic contact; also in the use of non-conducting supports between the interior of the tube and the exterior of the central conductor, for the purpose of preventing the conductor coming in contact with the tube, and preserving a uniform distance between them in all parts; also in providing for the movement of the central conductor and its non-conducting supports within the tube to permit the deposition of the metal on all parts of the interior of the lead pipe, which could not take place if the supports were stationary; and lastly in connecting the poles of the battery at opposite ends of the tube and central conductor to insure uniformity of deposit throughout the whole length of the tube. The inventor of this improvement is John Matthews, Jr., of this city.

SEWING MACHINE.

One part of this invention relates to the feeding apparatus, and is an improvement in that kind of feeding apparatus sometimes termed the "four motion" feed. In this feed the dog rises from below the surface of the work-plate to bite the cloth or other material before advancing to move it, and descends to release the material before it moves back preparatory to the repetition of its operation. To effect this movement the dog has been heretofore generally, if not always, raised to bite the material with a positive movement effected by a cam or its equivalent, and has been generally depressed to release the material by its own weight or by the elasticity of a spring, to which it has hitherto been attached. This improvement consists in the employment of a spring to force the dog upward to make it bite, in combination with a cam to depress it to liberate the material, by which simple change some very important results are obtained, as will be easily understood. It also embraces certain means of withdrawing the dog from the material at the pleasure of the operator, to admit of the material being moved or for any other purpose, as well while the needle is out of, as while it is in the material. Another part of the invention consists in a novel arrangement of a hook to operate in combination with a needle and a reciprocating shuttle, interlocking the thread so as to form a half-knot, thus making a secure stitch. This device has been patented to Charles Scofield, of Adams, N. Y., and Clark Rice, of Watertown, in the same State.

CUT-OFF.

This invention relates to the employment as a cut-off, in combination with a slide valve or valves by which the induction and eduction of steam to and from the cylinder of the engine are effected, of two puppet valves, applied to seats provided for them in the ports of the slide valve or valves; and it consists in certain means of opening the said puppet valves at the proper time for the induction of the steam and of keeping them open as long as desired within the first half of the stroke of the piston, and then tripping them, and permitting them to close and cut-off the steam, the whole being arranged within the steam chest of the engine and operated by the movement of the slide valve, but made variable under the control of hand gear applied outside of the steam chest or of a governor. This improvement was designed by David Fellenbaum, of Lancaster, Pa.

BRIDLE BIT.

The object of this invention is to place the horse, especially a vicious one, under the better control of the rider or driver than it has hitherto been, and with the use of but a single pair of reins. The ordinary bar bits are frequently rendered inefficient in consequence of the animal grasping the bar with his teeth, and thereby preventing the action of the bit on the horses' jaw. The invention consists in the use of supplemental bars placed within the principal one, and having springs attached, the parts being so arranged as to adjust the action of the supplemental bars on the lower jaw of the animal in case of the latter grasping with its teeth the principal bar. The patentee of this invention is Henry Crane, of this city.

TEMPERING SPRINGS AND OTHER ARTICLES.

The object of this invention is to not only facilitate the manufacture of tempered steel articles, but also to temper the same in a better manner than heretofore. The invention is applicable to the manufacture of tempered steel articles which require to be bent or swaged in a particular form and tempered. The invention consists in applying water to the article to be tempered, while the latter is under pressure, and while being confined within a swage or die, and under the same heat in which it was formed or bent. The inventors of this improvement are C. G. and H. M. Plympton, of Walpole, Mass.

BARK SEPARATOR.

This invention has for its object the separating of the good from the worthless portions of bark, preparatory to the grinding of the former for the use of tanners. It is designed to have the invention applied to a bark mill in such a way that the separated superior portions of the bark may pass directly into the mill and be ground, the worthless portion dropping from the machine, while the portions of medium quality are reduced to dust by the action of the saw or cutter, separated from the other portions and discharged from the machine at a separate point. This device has been patented to Joseph Brakeley, of this city.

BAROMETERS.

The object of this invention is to make a mercurial barometer that shall be perfectly portable and free from liability to breakage in transportation. The invention consists in a certain mode of applying a valve in combination with a cistern surrounding the lower end of the tube, to provide for the closing of the lower end of the tube to keep it full of mercury, and thereby to exclude the air when it is desired to transport the barometer. The credit of this contrivance is due to Lum Woodruff, of Ann Arbor, Mich.

OUR SPECIAL SOUTHERN CORRESPONDENCE.

One of the assistant-editors of this journal has gone on a rapid trip down the Mississippi, as far as New Orleans, and will thence proceed to Galveston, Texas, visiting some interior portions of the State. During his absence he will furnish us with a weekly letter upon such topics as he may deem of interest to our readers. The first letter appears in this week's issue, and we expect soon to receive from his pen some account of the rise and progress of the cotton-seed oil business (which is now so rapidly assuming importance) and other industries of the southern States.

PURE BENZOLE FROM COAL NAPHTHA.—The sulphite of phenyle and ammonium ($C^{12} H^5 NH^4 2 SO^3$) usually called sulphobenzolate of ammonium, yields a very large proportion of pure benzole when submitted to dry distillation. The hydro-carbon thus procured can hardly be distinguished from the benzole obtained by heating benzoic acid with lime. Its odor is etherial, almost fragrant; and its boiling point is constant at 80°8. A chemists well acqnainted with the ordinary benzole obtained from coal naphtha, to whom I showed a specimen of the benzole thus prepared from the sulphobenzolate of ammonium, scarcely recognized it as the same substance, so pleasant was its color. To prepare the sulphobenzolate, the purified benzole of commerce is dissolved with the aid of a gentle heat, in a slight excess of fuming sulphuric acid; if ordinary oil of vitriol be employed, a much larger quantity of the acid is required. The acid liquid, after having been heated in the water-bath for some time, is allowed to cool, and then diluted with water. Commercial carbonate of ammonium, together with some ammonia water, is to be added till the solution is slightly alkaline. The whole is now evaporated to dryness in the water-bath, and the dry mass exhausted with boiling alcohol. The greater part of the sulphate of ammonium remains in the residue. The alcoholic solution of the sulphobenzolate of ammonium is to be transferred to a retort, and submitted to distillation. When all the alcohol has distilled over, the receiver is changed, and the heat raised. The benzole which collects in the receiver is accompanied by small quantities of solid products and by water. From these it may be separated by the addition of a strong potash solution, and the removal of the supernatant oil by the pipette. The benzole is then rectified off caustic potash. The benzole thus produced is perfectly pure, and although the quantity obtained is not very large, yet the result of the process is exceedingly interesting to the chemist, since it removes all doubt concerning the identity of the benzole from coal naphtha and similar sources with that obtained from benzoic acid.—*Chemical News.*

INTRODUCTION OF FIRE-ESCAPES.—The fire-escape imported from London by some gentlemen in this city, and constructed upon the plan illustrated on page 244 of the present volume, has been tested and promises to give good satisfaction. Messrs. Mickle & Carville, who, some months ago, patented (through the Scientific American Patent Agency) a fire-escape, which was illustrated on page 260 of the present volume, have been awarded $20.000 by the Common Council, to introduce their invention into the city.

INCREASE OF INVENTIONS AT THE SOUTH.—We have lately noticed a marked increase in the number of applications for patents from the southern States. Our receipts of money on account of patent business, published weekly, bears testimony to this fact. The activity of the inventors augers well for the prosperity of any section of the country.

STEEL DIES.—On another page will be found the advertisement of W. K. Lamphear & Co., of Cincinnati, Ohio, manufacturers of hand-made tools. We have examined specimens of their steel dies, which appear to be of the first quality, and of that character which first-class workmen use.

PATENTS FOR NEW INVENTIONS.—All persons who are interested in procuring Letters Patent for new inventions are invited to read the advertisement of MUNN & CO. (in this number), who, in connection with JUDGE MASON, late *Commissioner of Patents*, attend to every branch of this business.