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Contents:

(Illustrations are indicated by an asterisk.)

PURIFICATION OF LUBRICATING OIL.

Oil for lubricating purposes is very high at the present time, and should be carefully used. Much of it is not only lost by improper use, but is actually thrown away by persons who are too reckless or naturally too wasteful and, regardless of their own property to take any care of that belonging to others. It is a little singular that men who are thought unfit for higher positions are generally made to oil the shafting in factories, where they can waste a gallon every day by slovenly and stupid use of it.

When oil is poured on a bearing, if the shaft be in motion, it takes up a supply enough to cover the surface, while the superfluity runs off at the nearest outlet. If there happens to be a drip pan underneath the hanger, the oil is caught, and when the pan gets full, the contents are summarily thrown out of doors into the nearest waste hole.

Although much of this oil is full of metallic dust, the result of wear, that does not prevent it from being used again when properly treated to remove the foreign matters. This can be done so simply and so easily, that we think much economy to manufacturers will result from the adoption of the following process:—

When the oil is taken from the drip pan, it should be poured off carefully, so that the heaviest part of it, which settles at the bottom, may be treated separately. The lightest or upper portion should be put in a vessel and heated gradually to a little below the boiling point of water. From this vessel it should run through flannel, to filter it, which will remove the finest metallic dust held in suspension by the oil. From this filter the oil will come out semi-transparent, but in a great measure free from the grosser impurities. A filter of *animal* charcoal, or coal made by burning bones, should then be used, which will detain the dirt that still remains behind, and render the oil fit for use again for most purposes.

Oil thus treated will not have the bright and clear appearance of that bought in barrels, but it will be very good, and may be used over and over again with comparatively small waste. Animal charcoal can be had of all wholesale druggists.

For large works, it would be profitable to have a place prepared particularly for the object of purifying the waste oil by the means above described. Other and more complicated processes are employed by refiners to extract impurities from oils, but they are obviously unsuited to persons not acquainted with chemical changes and affinities, and would be useless to our readers. We do not see why it would not be a profitable scheme for those versed in such matters, to collect the waste oil from drip pans and render it pure again for a small sum per gallon. It is not only the spent oil which falls into these drip pans, but that lavishly poured over the hanger by the oiler, so that the contents are very different from common slush. The process above described has been tried on a large scale and is not a mere experiment.

GOOD WILL.

Among the many contrasts between aristocratic and democratic communities, one of the most important in its effect upon human happiness is the great difference in the degree of sympathy between individuals who chance to be in different positions or pursuits.

One of the most impressive pictures in the Dusseldorf gallery was that representing the grinding tyranny in which the poor weavers of Silesia are held by their employers. The famous poet, James Hogg—the "Ettrick Shepherd"—was invited by some of the nobility of England to visit them at their houses, and he said that while, in directly addressing him, they were perfectly polite, he could see, in their talking with each other, that they regarded all those belonging to the non-noble classes as an entirely distinct people—as distinct as the planters in our Southern States regarded their negro slaves. No one can come in contact with any portion of English society without perceiving that it is pervaded with this sentiment of class. The universal feeling is, that persons should be taught to know their place, and that they should not attempt to rise above their position. The desire is quite as strong to keep others down as to get up themselves. This is seen even in their charities, which take the form of alms-giving, and degrade the recipients.

On the other hand, in democratic communities, the general spirit is to give every man a free chance to rise just as high as he can; and even in many cases to give him a friendly lift upward. How uniformly have the great sums, so lavishly given away in this country, been directed to elevate in the scale of humanity the least favored portions of the community! See the wealth of the country everywhere voluntarily burdened with a heavy tax to provide free schools for the children of all. See the Cooper Institute, in this city, with its magnificent reading-room and its admirable lectures, free to all comers. See the Astor Library, the Lawrence Scientific School, and hundreds of similar establishments scattered over the country, all designed to aid the poor and friendless in elevating their nature and position.

Along with this kindly feeling their is one also of mutual respect. Generally the native born American who employs men in his manufactory or his business, looks upon them as fellow citizens, and not as hostile and degraded enemies. He has an instinctive consciousness that the practice of petty tyranny is degrading to the one who practices it, as well as to the one upon whom it is inflicted; and that there is infinite dignity in the observance of manly courtesy towards all with whom he has to deal. There is also a quiet self-respect among workmen, in striking contrast with the extreme severity generally observed abroad.

We have sometimes thought that the rapid growth of wealth, the increasing congregation of people in large cities, and the influence of foreign immigration, both of employers and employed, were tending to build up a hostile class-feeling in this country; but it is probable that these influences are more than counteracted by those of an opposite tendency—that the steady growth of democratic principles, the equality of all men before the law, popular suffrage and free schools, are spreading more and more widely among the millions of our people the spirit of universal good will.

STARCH AND SUGAR.

One of the principal ingredients of grain, seeds, roots and tubers, is starch. It is found more or less in all plants and trees. Nearly four-fifths of the solid part of the bread we eat is starch.

Mix common flour and water; strain through muslin; the milky strained fluid contains starch, which soon settles as a white powder. Rasped potatoes yield starch in the same manner. The substance remaining upon the muslin, after straining, is gluten, which gives cohesion to the flour in bread.

Water does not dissolve starch, but the granules absorb water, causing them to swell and unite into the form of a jelly. It is this swelling of the starch in rice, beans, peas, etc., that causes this enlargement during cooking.

If roasted to a yellowish brown color starch is so changed as to be soluble in water, and is then called dextrine, which is extensively used to thicken colors by calico printers; also by confectioners in making fig paste and other sweet compounds.

To make sugar out of starch heat it hotter than for dextrine; then make it into paste with water; then gradually add a small quantity of water slightly acidulated with sulphuric acid; then boil till transformation is complete, the result being sugar sirup. To remove the acid, add slaked lime, filter, evaporate the sirup, and you have grape sugar. An infusion of malt may be used instead of the dilute acid.

As a sweetener, cane sugar is far superior to grape sugar—1 pound of the former is equal to 2½ pounds of the latter. But the manufacture of grape sugar is so easy that it is extensively used in Europe to adulterate cane sugar.

Grape sugar can be readily made from cotton and linen rags, and also from saw-dust; 5 pounds of poplar wood will yield 4 pounds of grape sugar.

Chemical research indicates that starch and wood ought to be more easily converted into cane sugar than into grape sugar, but no method of making cane sugar from the above substances has yet been discovered. Such a discovery would be of immense value. Here is a grand subject for invention.

SAFES.

English business circles are just now agitated over the success of burglars in breaking into their strong boxes and rifling them of their contents at short notice. The principal agents used by the rogues in effecting an entrance are wedges. These are made of steel drawn down as thin as a knife edge at the point and very slow in taper; a small crevice where the door shuts in is sufficient to enter the wedge, when a few blows of the hammer and the subsequent insertion of stronger wedges forces the crack open so far that a crowbar can be used, and the door is wrenched open in a twinkling.

Simple though it may appear, the construction of safes which are thief and fire proof has involved much thought and kept a great deal of capital employed. The expedients adopted to secure both ends are various and need not be adverted to in detail since the citation of them would be tedious. Chilled iron safes have been proposed and are now in use in many cases, but these, although proof against a drill, are not against a sledge or percussive force of any kind. Steel plates alternately interposed between wrought or chilled iron have also been used, and are good defenses against drilling, for the time required to soften a hardened steel plate, so that a drill would cut it, is too great and too tedious to be undertaken by burglars.

Moreover thieves are not the class of men who are fond of industry, as a rule. If a sufficient reward is set before them they strain every sinew to win it in the shortest time, but with a limited prospect of success not many steel-plate safes will be drilled or softened by a blow pipe, as a foreign contemporary suggests they may be, at the point of attack.

Safes with small balls placed beneath the exterior plates have been invented, the idea being that when the drill penetrates the outer sheet the point striking one of the balls causes the latter to turn so that any penetration is impossible. So far as drilling is concerned there is a possible barrier to it, but a hole once made in the outside affords an entrance for gunpowder, so that in this respect such safes are extremely vulnerable. Besides when a hole is drilled in the outer plate the balls might be taken out.

The principal modes of rifling safes in this country is by this latter method—powder; and as yet we have had but little loss from bursting or prying open safe doors. As ill news travels fast, the success of thieves across the sea, in breaking open safes in the manner previously spoken of, will soon reach members of that ancient but not honorable profession here; we should

be glad to know that our safes are free from danger in this respect, as inspection of many of them convinces us that a few blows would do the business for them effectually.

THE CIRCUMLOCUTION OFFICE.

The great fiction writers of modern times have become popular not merely by their forcible imaginations and power of description, but by taking some public wrong and making it clear and plain before men, so that the correction comes naturally and necessarily; in so doing they have wrought great good. Charles Read, in his latest work, "Hard Cash," unmasked the iniquities of private mad houses. Thackeray held the mirror up to society; and Dickens, the great master, has rebuked official imbecility and dilatoriness scathingly.

In none of his works is his caustic and vigorous criticism more noticeable than in "Little Dorritt," where he speaks of the Circumlocution Office. Possibly a parallel might be found to it in this country, and many Daniel Doyces among our inventive friends. He says, in relation to the trial of an invention for the Government:—

"Mr. Clennam, will you do me the avor to look at this man? His name is Doyce—Daniel Doyce. You wouldn't suppose this man to be a notorious rascal, would you?"

"I certainly should not." It was really a disconcerting question, with the man there.

"No. You would not. I know you would not. You wouldn't suppose him to be a public offender, would you?"

"No."

"No. But he is. He is a public offender. What has he been guilty of? Murder, manslaughter, arson, forgery, swindling, house-breaking, highway robbery, larceny, conspiracy, fraud? Which should you say now?"

"I should say," returned Arthur Clennam, observing a faint smile in Daniel Doyce's face, "not one of them."

"You are right," said Mr. Meagles. "But he has been ingenious, and he has been trying to turn his ingenuity to his country's service."

[And after the hearing was finally granted, Mr. Dickens says] :—

How, after interminable attendance and correspondence, after infinite impertinences, ignorances, and insults, my lords made a minute, number three thousand four hundred and seventy-two, allowing the culprit to make certain trials of his invention at his own expense. How the trials were made in the presence of a board of six, of whom two ancient members were too blind to see it, two other ancient members were too deaf to hear it, one other ancient member was too lame to get near it, and the final ancient member was too pig-headed to look at it. How there were more years, more impertinences, ignorances and insults. How my lords then made a minute, number five thousand one hundred and three, whereby they resigned the business to the Circumlocution Office. How the Circumlocution Office, in course of time, took up the business as if it were a bran new thing of yesterday, which had never been heard of before; muddled the business, addled the business, tossed the business in a wet blanket. How the impertinences, ignorances, and insults went through the multiplication table. How there was a reference of the invention to three Barnacles and a Stiltstalking, who knew nothing about it; into whose heads nothing could be hammered about it; who got bored about it, and reported physical impossibilities about it. How the Circumlocution Office, in a minute, number eight thousand seven hundred and forty, "saw no reason to reverse the decision at which my lords had arrived." How the Circumlocution Office, being reminded that my lords had arrived at no decision, shelved the business. How there had been a final interview with the head of the Circumlocution Office that very morning, and how the Brazen Head had spoken, and had been, upon the whole, and under all the circumstances, and looking at it from the various points of view, of opinion that one of two courses was to be pursued in respect of the business: that was to say, either to leave it alone for evermore, or to begin it all over again.

"Upon which," said Mr. Meagles, "as a practical man, I then and there, in that presence, took Doyce by the collar, and told him it was plain to me that he was an infamous rascal, and treasonable disturber of the Government peace, and took him away. I brought him out at the office door by the collar, that the very porter might know I was a practical man who appreciated the official estimate of such characters; and here we are!"

DEATH OF DR. MOTT.

Valentine Mott, M.D., LL.D., died at his residence in this city on the 26th of April, in the 80th year of his age. Dr Mott was the most eminent of American surgeons, and his operations have never been surpassed in any part of the world. He was born at Glen Cove, Long Island, on the 20th of August, 1785, being descended from an English family that settled on the island in 1667. After studying medicine in this country he went to England and finished his studies under the tuition of Sir Astley Cooper. In 1809 he commenced the practice of his profession in the city of New York, directing his attention especially to surgery, in which he rose very rapidly to the highest position.

His first great achievement was in 1816, when he successfully performed an amputation at the hip joint. In 1818 he performed the difficult and delicate operation of placing a ligature around the bracheocephalic trunk or arteria innominata, only two inches from the heart, for aneurism of the right subclavian artery. This was the first operation of the kind in history, and the patient lived twenty-six days after. When Sir Astley Cooper heard of this wonderful achievement of his pupil, he remarked:—"I would rather be the author of that one operation than of all I have ever originated." This great triumph has since been imitated only by the first surgeons of the world.

His operation on the great arteries were unparalleled in the annals of surgery. He tied the common carotid forty-six times, the subclavian seven times—every one of them successful; the external iliac seven times—four successful—and the femoral fifty-two times; cut for stone one hundred and sixty-five times, and amputated nearly one thousand limbs. In 1827 he tied the primitive iliac artery. It was the first time this operation was performed in any country, and was perfectly successful. The subject of it, in 1856, was still living, his life then having been extended nearly thirty years. From 1818 to 1824 Dr. Mott performed a variety of original operations on the jaws, both upper and lower, which mark a distinct era in the annals of surgery. On the lower jaw he has performed sixteen capital operations—in four instances removing the bone at its temporo-maxillary articulation. On the 17th of June, 1827, he extirpated the entire clavicle for osteo-sarcoma, which is altogether the most formidable undertaking in surgery. This operation originated with him, and has been performed but twice since—once by Warren, of Boston, and once by Travers, of London. The subject, a distinguished clergyman of the South, was still living a few years before the rebellion.

He was the author of a number of medical works, and had a great many honors conferred upon him by learned societies at home and abroad.

THE MANUFACTURE OF CHEAP JEWELRY.

PROVIDENCE, April 23, 1865.

MESSRS. EDITORS:—Through the politeness of Mr. Steere, of this city, I have had an opportunity of visiting his large manufactory of rings, pins, bracelets, and other ornaments, and purpose in a few words to lay the principal processes before your readers in the clearest manner possible.

MIXING THE METALS.

The first step is to make the proper alloy. In former times the gold was procured by drawing a check on the bank where the proprietor of the works had a deposit, and marking it "gold," when the amount came in double eagles. Now coin is purchased at the current rate of premium, whatever that may be. Two or three hundred dollars of coin is placed in a crucible, with the proper proportion of copper and silver, and melted. Mr. Steere remarked, smiling, that they use no more gold than is necessary, still that they do use some may be inferred from the fact, that a few years since the man employed at his works in melting had abstracted $20,000 of it before the theft was detected.

ROLLING.

The next step is to roll the alloy down to the thickness required for the work. To illustrate this operation, Mr. Steere took a nickel cent from his pocket and presented it to the rollers, but they refused to draw it in till he dipped the edge in spirits of turpentine, thus increasing the friction, when it was instantly drawn through. It was elongated into an oval form, and by repeated passages, the rollers being screwed more closely together each time, it was drawn to a length of six or eight inches in a direction transverse to the rollers, while its width in a line parallel with their axes was hardly increased at all.

STRIKING UP.

The pieces are next cut from the plates of metal, generally by a punching process, and where anchors, crosses or other figures are raised on them, this is done by striking up. A steel die has the figure formed in it by the usual method of die-sinking, and a corresponding figure is raised upon a steel bed or anvil, the upper die being attached to the lower side of a heavy mass of iron which is secured between two vertical slides. The workman raises the heavy mass of iron with the die which is attached to it, lays the bit of thin alloy on the anvil, and lets the upper die fall upon it. The blow presses the thin plate of metal between the dies, imparting to it the figure which is engraved upon them.

When the figure is very much raised, it is impossible to produce it at one blow without breaking the metal. In this case it is necessary to employ two or three pairs of dies, raising the figure partially in the first, and completing it in the last.

SOLDERING.

At a long bench running down one side of the shop, opposite a row of windows, were seated some 20 or 30 high-priced workmen, engaged in putting together the fashioned pieces of metal and finishing the articles. One man was soldering rings. He had about two dozen placed in small slits in a plate, so as to hold them conveniently, with a little solder and borax on the joint to be soldered, and with a blowpipe in his mouth he was directing the tip of the flame upon one ring long enough to melt the solder, when he moved the plate so as to bring another ring under the flame.

FINISHING.

Some of the workmen were soldering stones into breastpins, and others were putting the final polish to the ornaments. After this they were packed in cases and laid away in massive iron safes. Mr. Steere took from one of these safes a lump of gold weighing perhaps four ounces, and stated that it was absolutely pure, having been reduced from the chloride. Its color was the clear yellow characteristic of pure gold.

During the first two years of the war the manufacture of this class of jewelry was almost wholly suspended, but within the last two years the business has been resumed, and large quantities are now being made and sold.

Dickerson's Boiler.

The steam boiler of Mr. E. N. Dickerson, of this city, of which we gave an illustration on page 51 of the SCIENTIFIC AMERICAN, current volume, and on which there has been considerable discussion among engineers, is coming into use rapidly, and, from inquiry, we find that our principal engineering firms and engineers speak of it with great favor. The results obtained by this boiler are remarkable in point of economy and efficiency. It is also so compact in form that a boiler of 10-horse power is but little larger, externally, than a common dry-goods case, while, for accessibility and ease of examination, it is most conveniently arranged.

This boiler does not work on any miraculous principle, but simply brings the water in contact with hot iron, where it ought to be. In other words, by rapid circulation of the contents the heat is not only taken up from the surfaces through which it passes, or impinges against, but the mechanical disengagement of the steam from the water is very much facilitated from the same cause. This latter point is one of importance in the rapid production of vapor. We look upon this boiler as a great improvement in steam generators, and are pleased to know that many of them are now in use and being made; as also to accord Mr. Dickerson the credit of having obtained a result he has so long labored for.