

MARTINEAU, Harriet. 1851. "The Wonders of Nails and Screws". *Household Words* 4 (84), 1 de noviembre: 138-142.

will say that I died true and blest, because he was what he was ; and that I bade him a fond adieu, until we should meet again in a better world. For, O ! we shall meet again ; I have a testimony within, which will not deceive me !

"She then reverted to her father.

" 'He will come back,' she said ; 'you will see that he will come back, and he will inquire what is become of me—why his child has forgotten him and is silent. It will be the silence and forgetfulness of the grave. Perhaps he will come back as he went ; his heart yet unchanged ; defying and despairing. Tell him *not*—be patient with him, good kind friend, for my sake. There is good in him—good he knows not of, himself ; that nobody knows of, but his loving child, and the God who made him—weak and erring as he is. Tell him, he must no more be weak and erring ; tell him there is forgiveness for all who will return at last, but that forgiveness supposes newness of life. Tell him——"

The sentence was unfinished by the lady, for he who listened fell prostrate on his face upon the floor.

They raised him up ; but his heart seemed broken. He neither moved nor spoke. Life, however, was not extinct ; for in this condition he remained many days.

They could not keep him where he was, for this benevolent institution was strictly devoted to women of the more refined orders. He was carried to a Hospital. There was nowhere else to carry him.

Seven days he lay without speaking ; but not absolutely senseless. The spirit within him was at work. In his worst days he had never wanted energy. His heart was ever strong for good or for bad. What passed within him, in those seven days, was between his soul and the Highest. He came out of his death-trance an altered creature.

The once handsome, dashing, profane, luxurious Julian Winstanley, looked now a very old, old man. Quite grey, very thin, and stooping much. From that time, he continued to earn his bread honestly, as an attendant in the very hospital where he had been recovered. He had a little room to himself, and it was filled with certain simple treasures, hallowed by his recollections.

His patient and tender attendance upon the sick, his assiduous discharge of all his duties, was beyond praise.

One day, a man who had risen to a very high post in one of our colonies, came to visit him. The two were long together. When they parted, it was evident that both had wept much.

The old man, after that, faded rapidly. One morning they found him dead in bed. His hands were clasped together, as if he had departed in the act of prayer. He lies buried in a neighbouring churchyard, under a simple mound of earth, such as covers the humblest and the poorest.

He had left behind him a scrap of paper, earnestly imploring that so it might be. So it was. May God forgive us all !

### THE WONDERS OF NAILS AND SCREWS.

SEVENTY-FIVE years ago our fathers were told, by a man of high character whose testimony could not be doubted, that he had himself seen several boys, under twenty years of age, each of whom could make two thousand three hundred nails in a day. This gentleman—Adam Smith—explained that, to produce so surprising a result, these boys must have passed their whole lives in nail-making ; for that a smith, who had been pretty well accustomed to making nails but not wholly devoted to it, could not make more than from eight hundred to one thousand in a day ; while a smith who could handle his tools cleverly but was unused to making nails, could not turn out more in a day than two or three hundred. The making of nails, Adam continues, is by no means a simple operation : he tells how the bellows have to be blown, and the fire mended, and the iron heated, and every part of the nail forged ; and how the tools have to be changed when the head comes to be shaped. Considering all this, it seemed, in 1776 (when this account was published), a wonderful example of dexterity, that young people should be able, with due effort, to make two thousand three hundred nails in a day.

That year seems not so very long ago : 1776 was the date of the American declaration of independence : and we are fond of saying how extremely young a nation is that of the United States. It is the date of our compulsory permission to that young nation to take care of itself, and to see what it could do by its own faculties. It has done a great many wonderful things ; and, among others, it has invented, and sent over to us, a machine by which boys can make more nails in a day than our readers would remember, if we were to set down the long row of figures. These Americans used to buy our nails, made in the way that Adam Smith describes. But in a few years, they found they had the iron and coal, and the heads and hands necessary for making steam-engines and nail-cutting machines—all at home : and instead of taking our nails, they have shown us how to make so many, that, if the same number were made in the old way, it would take half the nation to accomplish the work.

We do not want all these nails ourselves. Of the smallest kind of nail (tacks), some are still made on the anvil ; and those are probably for home use. They must be regarded as a humble manufacture, remaining from old times, on account of the expense of the new machinery. The establishment we saw, the other day, at Birmingham, makes twenty tons of nails per week, of all sizes together ; that is,

about four tons of the largest size commonly made—six inches long—and sixteen tons of other sizes, descending to the little tack which measures only three-sixteenths of an inch. No one can tell precisely how many are made in the kingdom, because there are numerous small manufacturers in the inland towns, whose sales are not ascertainable. But it is supposed that Birmingham alone may supply two hundred tons a week; and the whole kingdom, perhaps, five hundred tons. Now let the imagination follow this;—let us think of a handful of tacks, or the household box of nails, and follow these up to the pound, and the hundred-weight, and the twenty hundred-weights which make a ton, and think of five hundred of these tons, as a weekly supply; and we shall be full of wonder as to what becomes of such heaps of uncountable masses of nails.

The fact is, we send them very far over the world; even to Australia, where they are wanted in large quantities by the growing people there, who are always building more and more houses, and edifices of other kinds. We send vast quantities to the German ports, whence they spread over the interior of the continent. Canada is too near the United States to need any supply from us; and, indeed, there is nail-making going on at Montreal, which nearly satisfies the wants of that colony.

The sheets of iron brought as material to the establishment which we saw at Birmingham are six feet in length and two in width. These have to be cut into strips. The strips must not be cut the long way of the sheet, because that would bring the grain of the iron (for even iron has a grain) the wrong way for the nail, and a bad article would be produced, as surely as the wrist-bands of a shirt would look ill, and soon wear out, if they were cut the wrong way of the linen. As the nails are cut across the strip of iron, the strip must be cut across the sheet. Thus, it is clear the nails will be cut from the long way of the sheet.

As for the width of the strip, it must be somewhat more than the length of the nail, because the head must be allowed for. The longest nail that has been made in these machines is one of nine inches. A strip which is to make inch nails, must be an inch and one-eighth in width. It is a marvellous thing to see the cutting of these strips, which might seem to be thin pasteboard, but for the noise they make in falling. The hidden steam-engine turns the wheels of the shearing-machine. The iron plate is held to it, the edge put into a groove, and off comes the strip, as quick as thought. It is, in fact, cut from end to end, and not struck off with one blow; but the process is too rapid for the eye to follow—the machine making fifty revolutions in a minute. Thus, these iron ribbons are rained down at the rate of nearly one, every second of time.

Now we have the strips. How many nails will each yield? The number that must be got is two hundred and forty small tacks, or, if of the six-inch size, one hundred and twenty; the other sizes ranging between. It would be impossible to get this number, if one edge of the strip was to yield all the heads, and the other edge all the points. There would be much fewer nails, and a great waste of iron. The strip must be turned for the cutting of each nail, that the slope made by cutting the narrow part of the last, may serve for the broad edge of the next. This incessant turning of the strip is the one thing which the workman has to do. His machine actually does all the rest, and without failure or pause. Before each machine stands a rest—a good deal like what soldiers used to carry in the days of matchlocks, to rest their pieces on. It is like a large two-pronged fork set on end, prongs uppermost, and moveable in its socket. Taking hold of his strip of cold iron with a pair of long pincers, very like tongs, the boy lodges it across this fork, and proceeds to feed the machine with the metal which it is rapidly to digest into nails. A most vigorous and certain process of digestion it is. There is a sharp steel tooth at what may be called the mouth of the machine, the ledge on which the strip is laid. The tooth doubles back, like the fang of a rattlesnake, and, in doing so, it allows a sharp blade to fall, and slice off a nail. While the boy is turning the strip, the severed bit drops into a groove, where a pair of nippers seizes it by the point, and another advances from behind to strike and hold the shank. The point and shank being thus formed and held fast, a hammer comes on, driven from the right hand, to form the head. The severe blow which forms the head, releases the point and shank, and the finished nail slides down an inclined plain into a trough below. This process of forming the nail goes on in the dark—in a space below the cutting apparatus—in the stomach to which the mouth has sent down the aliment. But never was such quick digestion known in any kind of stomach, for it is empty between the mouthfuls. While the boy is turning his strip, and the blade is cutting it, the nail is dismissed from the groove—finished, head and point; but only finished as to form. It has still to be annealed;—that is, to be roasted, baked, stoned,—call it what you will. The nails are shovelled into square iron pans, with a chemical mixture, and thoroughly baked. When they come out, they are shaken in a sieve with sawdust; when cool, they are weighed, and made-up into parcels, or put into cases or sacks of "Dudley muslin;" as the coarsest and strongest of packing-fabrics is ironically called.

The premises used for this manufacture need not be large. The machinery occupies a very small space. A small Pembroke table fills more width than a single machine; and the machines may be placed as near together

as will merely leave room to pass. The steam-engine must be accommodated; and there must be an apartment or two for the repair or making of the machinery. The annealing, and cooling, and weighing, and packing can be done in a shed and yard. Adam Smith's young acquaintances would have wanted the whole site of Birmingham—for their forges, to make as many nails as go forth from the premises we saw. So compact is the space required, that one man attends to four machines. He is called a "minder." He engages a boy for each machine, and sees that it is properly fed. The "minder" is paid by the hundred-weight, for all sizes of nails, except tacks, which are paid by the thousand. It is calculated that one hundred-weight contains about fifty thousand nails of all sizes. If so, the quantity of nails formed in a year, in this one apartment, is no less than a thousand and forty millions! When we see the stroke given, which makes the head, we cannot but wonder where the nail will next be struck on the head;—whether in some shed on the banks of the Danube, or in the cabin of some peasant on the bleak plains of Russia, or in some Indian bungalow, or in a cattle-fold on the grassy levels of Australia, or in some chalet on the Alps, or on the brink of some mine high up in the Andes, or under the palm-roof of some missionary chapel in the South Sea islands. As the nails are snipped off and fashioned, much faster than the nimblest fingers can snip paper, it is wonderful to think how they will be spread over the globe, nowhere meeting, probably, with a single person who will think of where their heads were last struck; unless one of them should be floated, in some piece of wreck, to the feet of some Robinson Crusoe, who will start at this trace of a man's hand, and seem to hear once more the pant of the steam-engine, and all the sounds of busy toil, and the voices of men, for which his ear and his heart are thirsting. What would he not give to be a "minder" where that nail was made?—or the humblest helper on the premises, so that he might work among his fellow men?

The "minder" has it in his power to enjoy all the best things of life, if he so pleases. He easily earns from one hundred and twenty-five to one hundred and fifty pounds a year. But, unfortunately, he reckons his wages by the week. If clergymen and others—who would be glad of his income—did so, they might make less of their small means than they do; the weekly surplus being a constant temptation to spend. And too truly, too sadly, it is so with the "minder," with an exception here and there. If he receives five pounds a week for months together, and pays away nearly, or quite half, to the four boys below him, keeping fifty shillings or more for himself; and if the machinery has to stop for a few days, he is sure to borrow money of his employer. After years of constant employ-

ment and good health, if he falls sick, he has not a shilling beforehand. This story has been told before—often before—and it must be told again now—and often again—till the workman learns to accept that welfare from himself which he is too apt to expect from law or society, which can effectually help only those who help themselves.

In a neighbouring manufactory, which would seem to require the strength of hard-handed men, we find women employed in the proportion of ten to one: and of that one portion, many are boys. The manufacture is that of screws; steel, brass, copper, and a few of silver. From the smallest screws required for putting together the nicest philosophical instruments, to the heavy bolt-screws which sustain the wear and tear of mighty steam-engines, we find here specimens of all sorts and sizes. The forging must be done by men, of course; and here we find the anvil, and the glowing furnace (fed by the steam-engine), and see the great square heads of bolt-screws beaten while at a white or red heat.

The coils of wire, of different thicknesses, of which the screws are made, come from the wire-drawers. They have been made by drawing the heated iron through holes in hardened steel plates. The smaller kinds of wire are drawn, by a hard mechanical gripe, through smaller and smaller holes, till they become of the thickness required. Then the wire is brought to the screw manufactory; and there we see it lying about in shining coils. One end of a coil is presented to a machine worked by boys or women; when we see the end seized, and drawn forward, and snipped off the proper length, the snip falling, hot, into a pan of saw-dust below. Women are preferred to boys for this work. Their attention is more steady, and they are more careful of their own flesh and blood. Boys are apt to make mischief; and, if they look off their work, it is too likely that they may lose their finger-ends. It is in this department of the business that most of the accidents happen. It is more satisfactory to see the lads filing the circular saws used in making the machinery, or in other processes where they have not to deal with such inexorable powers as those which cut or stamp the metal.

The heads of the bits of steel are next stamped by machinery, and delivered over to women to have the heads polished. There is nice fingering required here; and, to do it, we see rows of women, who earn from five to twelve shillings per week, each attending a machine of her own. She presents the head of the screw to a vice, which seizes it and carries it to a flying wheel, which smooths and polishes it; and it comes out in an instant, brightened with that radiating polish which we observe in the head of a finished screw. All the while, a yellowish ugly

liquid is dropping upon the metal, and upon the work-woman's fingers, from a can above. It is a mixture of soapsuds and oil, which dribbles from a spout, and keeps the metal from becoming too hot for the touch.

We have now the shank of the screw, and its neat polished head: but there is no slit in the head wherein to insert the screw-driver; and the shank is plain and blunt. The next thing is to "nick" the head. This part of the business used to be done by working the "nicking" machine with treadles. By the modern method, a barrel—somewhat like that of a barrel-organ, but pierced with holes, instead of being stuck over with upright bits of wire—revolves slowly, so that every row of holes is brought under the line of a cleaver, which descends to make the cleft across the heads of the screws in a row beneath. It is the business of the steam-engine to turn the barrel, and send down the cleaver: it is that of the women to stick the screws into the holes in the barrel,—as they would put pins in rows into a pincushion. They do this with quickness and dexterity, as the empty holes come up; and the notched screws fall out by their own weight, on the other side, as it descends with the revolution of the barrel.

This is all very well, as far as it goes: but the shank is still plain and blunt, and perfectly useless. The grand operation of "worming" remains. This also is women's work; and we may see one hundred and twenty women at a time busy about it. The soapsuds and oil are still dropping upon their fingers and their work; and the job looks anything but a tidy one, while we regard the process alone. But it is different when we stand aside, and survey the room. Then we see that these six score women are neatly dressed; hair smooth, or cap clean—handkerchief or little shawl nicely crossed over, and fastened behind; faces healthy, and countenances cheerful. These women are paid by piecework; and they can easily earn ten shillings per week. Their business still is to feed the machinery—to present the heads of the screws to a vice which seizes them, and carries them forward—then back again, and again forward—as often as is necessary to have the worming made deep enough. As the shank is pressed, in its passage forward, against the cutter which grooves out the steel between the "thread,"—which, in other words, "worms" it,—the filings curl away and drop off, like so much wood, or rasped cheese-rind. It is wonderful to see this rasping of steel. But we were informed that there will be something hereafter more curious still to be seen. On these premises, there is at work now some machinery which is shut up from prying eyes, by which the shank is picked up, wormed, and dropped, without being touched by human hands: and strange it must be to see the screw, not a quarter of an inch long,

picked up by a metallic gripe, and the largest—massive and heavy as they are—carried onward, again, and again, and again, as the depth of their worming requires.

After this comes the cooking in sawdust; and the drying and bolting (as a Miller would say) of the finished screws in sieves; and the counting, and the packing. They are counted by weight, of course. The packing is a pretty affair. A nimble-fingered woman throws down half-a-dozen or more screws, according to size, on a square paper, the heads lying all one way; and then the same number, with the heads lying the other way, and the shanks falling between the first. Then the same number are laid across; and so the pile is built up into a square, which is kept compact by the wall of round heads on all the four sides. The paper is folded over, and the square packet is passed to a neighbour, to be tied up. With a dexterous twist of the string she fastens on a specimen screw, ties the knot, and passes on the packet—to be sent to Germany, or almost anywhere in the world where men are screwing anything together—always excepting the United States. Very few are sent there; for, as we were again told here, America rivals us, or, as would be said across the Atlantic, "America flogs the world" in screw-making. There are eight houses in Birmingham employed in this manufacture: and this was all we could learn of the amount of production. No one seems to know how many are made in England; for no one can tell what proportion the produce of the little manufactories bears to these larger ones.

Seeing whole bins full of steel filings, and copper, and brass, we inquired what became of them. They are sold; the steel being worth little, and the brass much. The brass comes in at the cost of ninepence per pound; and the refuse goes out, as filings, at fivepence per pound. After the noise and dirt of the earlier processes—the oily wheels, the greasy candles in dark places, the smutty forge, and the yellow dropping from the cans, there is something pleasant in the aspect of the last stages;—the barrels of shining brass filings; the quiet light room where two or three neat women are fingering polished screws, surrounded by drab and brown paper, while behind them are compartments completely covering the wall, filled with their square drab packets.

As we turned away from the hundreds of women thus respectably earning their bread, we could but hope that they would look to it that there was no screw loose in their household ways, that the machinery of their daily life might work as truly and effectually as that dead mechanism which is revolving under their care, for so many hours of every day. It is much to see dead mechanism producing strength and convenience, in a flow as constant as that of the stream from the cavern in the rock: but it is much more to see vital comfort

and beauty issuing from an intelligent daily industry, which works on behalf, not of vanity and wasteful pleasure, but of home.

### WANTED, AN ORGANIST!

THE church organ had, for years, been the great musical anxiety of the parochial district of Twirlington. It was a "Father Smith;" had seen its best days; and, to use the idiom of Captain O'Sullivan, bothered the organist entirely. If he played on the full organ, people complained that the shrill sesquialtra drowned their voices. If he played on the diapasons, or the choir organ, people could hear nothing, and could not follow the tune. If he used the swell, it jerked the people into the middle of the next verse. One half the congregation said the organ wanted power; the other half thought it too loud. The first half thought there was too much music in the service; the second half declared that the Litany and responses ought to be chanted, as at St. Bell's Church, Oxford Place, Cambridge Street. The only matter they agreed in, was in worrying the organist, and in determining not to spend a shilling on the organ to make it better.

After some seven or eight years of badgering, the organist gave up his situation, very much impaired in health, and reduced in spirits to a state of chronic melancholia. The vicar had contrived to get the parish into debt, for certain repairs and alterations of the church by a contract, the terms of which few of the rate-payers understood; and, having made a sort of composition with a wealthy tallow-chandler for the settlement of the contract, the tallow-chandler's daughter was quietly inducted into the vacant situation. Nobody understood anything about the reasons for the choice, except that Miss Kidd was an indifferent pianist, and that her father was a sort of bill-discounter, and had a great deal of property, together with six votes in all parochial elections. Although the vicar's "set" were satisfied, people of taste became angry.

Matters, however, went on as usual. The vicar, the Reverend Prebend Shuckscuttle preached as heavily, and spent the same number of months in the country, as of old. The new organist's style was execrable, and her touch unsteady. She took a long time to forget that an organ was not a stringed instrument; and, instead of holding down the keys to sustain the sounds of the longer notes, brought out the fine old psalm tunes in short puffs of the most aggravating *staccato*. To increase the tortures of the Twirlington amateurs, Miss Kidd's brothers, sisters, and intimate friends, got up such a powerful choir, that while it advantageously drowned the organ, it bawled down the voices of the congregation. The service itself was neither cathedral nor parochial; but a clumsy medley of both. One set of psalms were chanted, and others read,

without even a rubrical reason for the distinction. The choir, destitute alike of taste or training, sang the penitential and thanksgiving psalms with the same deafening, but unsteady, vigour. The whole performance, vocal and instrumental, seemed to consist of a series of jerks, which made people tremble for the organ case and the organ gallery. One beautiful feature throughout, was the compact uniformity of the whole service; for no one could detect the slightest variation in the import of the words, or in the character of the melodies.

The Reverend Prebend Shuckscuttle cared very little about things in general, and still less about music. He hated the pedal pipes at St. Doncaster cathedral, because they burred over his head while he dozed through the afternoon cathedral prayers; and he had an indistinct notion of the musical profession as being made up respectively of organists, of people who gave lessons, and of theatrical performers. Fog, the junior churchwarden, made a bother now and then, but he was afraid of the vicar; and Stegg, the senior, or vicar's churchwarden, never said anything but what the vicar said about anything.

Just about this time, the Reverend Epitaph Bronze threw the neighbouring parish of Foxglove-upon-Willows into a fearful turmoil, by suddenly turning to the East, cutting down his ample shirt collar to the even dimensions of a hoop, and opening an extensive account for wax candles with Mr. Kidd, senior. People began to draw invidious comparisons; and, it was soon currently reported that the Kidd family supplied both parishes with candles, and that their hearts turned towards Rome. Miss Kidd's supposed religion gave more offence than her bad playing; and the vicar stood attainted with the charge of bringing in a Roman Catholic organist, to serve matters of private convenience.

But the Reverend Prebend Shuckscuttle was not easily put out of his way. He evaded the pertinent questions of influential individuals, and took care never to listen to those of the mediocracy. As to interfering with the organ, "he could not think of putting the parish to any expense."

At length, fortunately for the Twirlington parish, the Bishop of Smithering rewarded the Reverend Prebend Shuckscuttle for having a great deal of money, by giving him a great deal more, in the rich living of Duggenfield West. A successor was appointed immediately. This gentleman was an active and pleasant sort of man, liked things properly done, and began to remedy much of his predecessor's mismanagement. Miss Kidd troubled him sadly. He could not get rid of her, because the appointment was understood to be permanent; although a nominal re-election was kept up every Easter Monday. He was, moreover, too much the gentleman to interfere with a female under any circumstances. He, however, quietly cashiered the