## HOW NEWSPAPERS ARE MADE.

In our last issue we published from the *Evening Mail* some interesting details concerning the machinery employed in the production of newspapers. We continue the subject from the same journal. The last article left the types on the "galleys."

Our matter has been set up, justified, proved, and revised, so that we are now ready to make it up in columns. Ordinary job work is set up on a flat bed, inclosed in an iron frame called a "chase," and locked up by means of wooden wedges, but all newspapers of considerable circulation use the type-revolving press, and the matter is made up, therefore, entirely on "turtles."

### "MAKING UP."

These are very heavy, and each, therefore, has a wooden stand of his own, about waist high, which may easily be rolled from place to place. The column rules—that is, the lines between the columns of the paper—are each all in one piece and permanently attached to the turtle, so that type can easily be slid up and down the column. Daily papers require one workman to keep the run of the advertisements alone, and insert or omit them on the proper days according to the arrangements of the publication office. The advertisements, then, are placed in their proper columns in the turtles—the matter being transferred in small portions—then the general matter, room being reserved for the late matter and dispatches. These set up and proved, in they go; a foreman locks up the type with a wrench, which drives screws that compress the columns from the bottom, the type is hammered, to make it even, with a block and mallet, and the forms are ready. Each page requires one turtle. They are awkward looking, curved arrangements, with projections on the bottom by which they are fastened on to the press cylinder, and weigh, when filled with type, nearly a quarter of a tun.

### THE PRESS-ROOM.

Nearly all the dailies have their press-rooms in their basements and their compositors in the attic, so that the turtle is whizzed down the "dumb-waiter"—as our housekeeping friends would say—into the nether regions at a great rate. Here it is received on another stand and rolled to the press, over which is a sliding beam with hoisting apparatus to get the turtle upon the press. This requires the strength of two or three men, who hoist it, slide it along, and lower it carefully upon the cylinder, which has been stopped just so as to receive the turtle at the top. The creak of the hoisting calls the pressmen to their machine, one man to feed each paper cylinder—from two to ten in number—and several to stack the papers thrown off by the flyers of the press.

### "STARTING UP."

The turtles fastened on, the nearest pressman turns the lever and off goes the press, piling up the papers at the rate of a couple of thousand copies an hour for each cylinder. The *Mail* press is a four-cylinder and rattles off its eight thousand an hour at a great rate. The *World* has a ten-cylinder press, the largest size made. In these a labyrinth of stairways are required to reach the various parts, and the room must be at least twenty feet high. Two eight-cylinders supply the readers of the *Tribune*. The *Herald* has five Hoe presses.

### THE NEWSBOYS.

One of the important adjuncts and chief botherations of an evening paper are the newsboys—including girls—who congregate in the part of the press-room allotted to them, and do their best to overflow to where they may get at the press and the machinery. They sell morning papers from six to ten, Grecian Bends during the middle of the day, evening papers in the afternoon, and, as a general thing, go to the New Bowery in the evening. *Ad interim*, they lay off on the press-room steps, tell stories, and fight, the girls being, as a general thing, better than the boys at the latter.

### A PRESS CURIOSITY.

One of the curiosities of Printing House Square is the huge engine which runs the *Mail* press, as well as many others. This is owned by a firm in Spruce street between William and Nassau, and occupies the basement of their building There is a large 150 horse-power engine which runs during the day, and a 75 horse-power which relieves it at night. From this shafting and belting distribute the power in every direction. One shaft runs to and across Frankfort street, supplying the *Mail* and other offices, another crosses William street and runs the six cylinder presses which pile the 300,000 copies of the *Ledger* in its beautiful press room. Another shaft crosses Spruce street, runs through and across Beekman, and even supplies presses in Ann street.

### ITS SHAFTS AND BELTING.

Altogether these engines supply over 125 presses—each being estimated and charged so much per horse-power according to this estimate. It runs three-quarters of a mile of main shafting, beside a mile or more connecting shafts and as much belting. One of these belts, an india-rubber one, 120 feet long, connects a fifth story press on Nassau street with the main shafting on Spruce across the intervening yards, and another leather one on Beekman street street, 140 feet long, perfectly perpendicular, connects the sub-cellar and attic.

### WHAT IT DOES.

This engine prints all McLaughlin's toy books, runs the immense establishments of Bradstreet and J. W Oliver, beside many other job printers, and a hoop-skirt manufactory and several binderies, and prints nearly fifty papers, beside magazines and books innumerable, among them, beside the *Mail*, the *Independent, Dispatch, Leader, Star, Examiner and Chronicle, Observer, Courier, Clipper, Wilkes' Spirit, Turf, Field, and Farm, Police Gazette, La Crosse Democrat, Ledger, New York Weekly, Literary Album, Sunday Times, New Yorker Democrat, Commonwealth, Scottish American, Freeman's Journal, Tablet, Emerald, Irish American, Irish People*, etc., etc. Truly a power in the world.

### FOLDING THE PAPERS.

Most of the quarto dailies have folding machines in their press-rooms, which fold a pile of papers with incredible rapidity. The weeklies are mostly folded by hand, the workmen attaining a wonderful expertness. Nearly a dozen men are occupied, however, with all their quickness, in folding and mailing the weekly issue of the *Independent*.

### ABOUT PAPER.

One of the most important items in the cost of a paper is the paper itself. Some of the statistics of the *Tribune*, the largest sized paper published, will show its extent. Its paper weighs 65 pounds per ream (240 sheets), and measures 37 by 47¾ inches. One issue of the 240,000 copies of the *Weekly Tribune* weighs 31,200 pounds, over fifteen tuns. This makes a column three feet by two at the base, and one hundred and forty feet high. The paper used by the *Tribune* establishment during the year is about fifteen hundred tuns, costing over $300,000, which, if piled, would make a monument of solid intelligence one mile high and four feet square. Something like twenty-five million sheets pass their presses every year.

### MAILING PAPERS.

Another considerable item is directing papers to mail subscribers. It is calculated that to write the directions of one issue of the *Weekly Tribune*, sixty-seven persons would be employed a whole day. Most papers, therefore, adopt the system of keeping the names of subscribers on printed lists, which are cut apart and pasted on the papers. These are then made up in bundles for each postoffice, and thus started off. It takes several cars to carry the weekly editions of our morning papers which are sent to the West.

Such, reader, are the immense agencies at work in a merely mechanical way in producing for you your daily paper, which costs you five, four, or "only two cents."

## THE EARTH A MAGNET.

The Cornhill Magazine contains an article with the above title which, contains in a popular form, the facts and theories in regard to terrestrial magnetism, a condensation of which will be of interest to our readers.

"The peculiarity that the magnetic needle does not, in general, point to the north, is the first of a series of peculiarities which we now propose briefly to describe. The irregularity is called by sailors the needle's variation, but the term more commonly used by scientific men is the declination of the needle. It was probably discovered a long time ago, for 800 years before our era the Chinese applied the magnet's directive force to guide them in journeying over the great Asiatic plains; and they must soon have detected so marked a peculiarity. Instead of a ship's compass they made use of a magnetic car, on the front of which a floating needle carried a small figure whose outstretched arm pointed southward. We have no record, however, of their discovery of the declination, and know only that they were acquainted with it in the twelfth century. The declination was discovered, independently, by European observers in the thirteenth century.

"As we travel from place to place the declination of the needle is found to vary; Christopher Columbus was the first to detect this. He discovered it on the 13th of September, 1492, during his first voyage, and when he was six hundred miles from Ferro, the most westerly of the Canary Islands. He found that the declination, which was toward the east in Europe, passed to the west, and increased continually as he traveled westward.

"But here we see the first trace of a yet more singular peculiarity. We have said that at present the declination is toward the west in Europe. In Columbus' time it was toward the east. Thus we learn that the declination varies with the progress of time, as well as with change of place.

"We find first, that the world may be divided into two unequal portions, over one of which the needle has a westerly, and over the other an easterly, declination. Along the boundery line, of course, the needle points due north. England is situated in the region of westerly magnets. This region includes all Europe, except the north-eastern parts of Russia; Turkey, Arabia, and the whole of Africa; the greater part of the Indian Ocean, and the western parts of Australia; nearly the whole of the Atlantic Ocean; Greenland, the eastern parts of Canada, and a small slice, from the north-eastern part of Brazil. All these form one region of westerly declination; but singularly enough, there lies in the very heart of the remaining and larger region of easterly magnets, an oval space of a contrary character. This space includes the Japanese Islands, Manchouria, and the eastern parts of China. It is very noteworthy also, that in the westerly region the declination is much greater than the easterly. Over the whole of Asia, for instance, the needle points almost due north. On the contrary, in the north of Greenland and of Baffin's Bay, the magnetic needle points due west, while still further to the north (a little westerly) we find the needle pointing with its north end directly toward the south.

"In the fifteenth century there was an easterly declination. This gradually diminished, so that in about the year 1657 the needle pointed due north. After this the needle pointed toward the west, and continually more and more, so that scientific men, having had experience only of a continual shifting of the needle in one direction, began to form the opinion that this change would continue, so that the needle would pass, through north-west and west, to the south. In fact, it was imagined that the motion of the needle would resemble that of the hands of a watch, only in a reversed direction. But before long observant men detected a gradual diminution in the needle's westerly motion. Arago, the distinguished French astronomer and physicist, was the first (we believe) to point out that 'the progressive movement of the magnetic needle toward the west appeared to have become continually slower of late years' (he wrote in 1814), 'which seemed to indicate that after some little time longer it might become retrograde.' Three years later, namely on the 10th of February, 1817, Arago asserted definitively that the retrograde movement of the magnetic needle had commenced to be perceptible. It appears from a careful comparison of Beautoy's observations that the needle reached the limit of its western digression (at Greenwich) in March, 1819, at which time the declination was very nearly 25°. In Paris, on the contrary, the needle had reached its greatest western digression (about 22½°) in 1814. It is rather singular that although at Paris the retrograde motion thus presented itself five years earlier than in London, the needle pointed due north at Paris six years later than in London, viz. in 1663. Perhaps the greater amplitude of the needle's London digression may explain this peculiarity.

"'It was already sufficiently difficult,' says Arago, 'to imagine what could be the kind of change in the constitution of the globe, which could act during one hundred and fifty-three years, in gradually transferring the direction of the magnetic needle from due north to 23° west of north. We see that it is now necessary to explain, moreover, how it has happened that this gradual change has ceased, and has given place to a return toward the preceding state of the globe.' 'How is it,' he pertinently asks, that the directive action of molecules of which the globe is composed, can be thus variable, while the number, position, and temperature of these molecules, and, as far as we knew, all their other physical properties remain constant?'

"But we have considered only a single region of the earth's surface. Arago's opinion will seem still more just when we examine the change which has taken place in what we may term the the "magnetic aspect" of the whole globe. The line which separates the region of westerly magnets from the region of easterly magnets, now runs, as we have said, across Canada and eastern Brazil in one hemisphere, and across Russia, Asiatic Turkey, the Indian Ocean, and West Australia in the other; beside having an outlying oval to the east of the Asiatic Continent. Now these lines have swept around a part of the globe's circuit in a most singular manner since 1600. They have varied alike in direction and complexity. The Siberian oval, now distinct, was, in 1787, merely a loop of the eastern line of no declination. The oval appears now to be continually diminishing, and will one day probably disappear.

"We find here presented to us a phenomenon as mysterious, as astonishing, and as worthy of careful study as any embraced in the wide domains of science. But other peculiarities await our notice. If a magnetic needle of suitable length be carefully poised on a fine point, or, better, be suspended from a silk thread without torsion, it will be found to exhibit each day two small but clearly perceptible oscillations. M. Arago, from a careful series of observations, deduced the following results:

"At about eleven at night, the north end of the needle begins to move from west to east, and having reached its greatest easterly excursion at about a quarter past eight in the morning, returns toward the west to attain its greatest westerly excursion at a quarter past one. It then moves again to the east, and having reached its greatest easterly excursion at half past eight in the evening, returns to the west, and attains its greatest westerly excursion at eleven, as at starting.

"Of course, these excursions take place on either side of the mean position of the needle, and as the excursions are small never exceeding the fifth part of a degree, while the mean position of the needle lies some 20° to the west of north, it is clear that the excursions are only nominally eastern and western, the needle pointing throughout, far to the west.

"Now if we remember that the north end of the needle is that furthest from the sun, it will be easy to trace in M. Arago's results a sort of effort on the part of the needle to turn toward the sun—not merely when that luminary is above the horizon, but during his nocturnal path also. We are prepared, therefore, to expect that a variation having an annual period shall appear, on a close observation of our suspended needle. Such a variation has been long since recognized. It is found that in the summer of both hemispheres, the daily variation is exaggerated, while in winter it is diminished.

"But beside the divergence of a magnetized needle from the north pole, there is a divergence from the horizontal position, which must now claim our attention. If a non-magnetic needle be carefully suspended so as to rest horizontally, and be then magnetized, it will be found no longer to preserve that position. The northern end dips very sensibly. This happens in our hemisphere. In the southern it is the southern end which dips. It is clear, therefore, that if we travel from one hemisphere to the other we must find the northern dip of the needle gradually diminishing until at some point near the equator the needle is horizontal, and as we pass thence to southern regions a gradually increasing southern inclination is presented. This has been found to be the case, and the position of the line along which there is no inclination (called the magnetic equator) has been traced around the globe. It is not coincident with the earth's equator, but crosses that circle at an angle of twelve degrees, passing from north to south of the equator in long. 3° west of Greenwich, and from south to north in long. 187° east of Greenwich. The form of the line is not exactly that of a great circle, but presents here and there (and especially where it crosses the Atlantic) perceptible excursions from such a figure.

"At two points on the earth's globe the needle will rest in a