CHAPTER I.

THE PRINTING PRESS—Its Principle—The Bed—The Carriage and Rails —The Tympan—The Frisket—Characteristics of the Albion and Columbian Presses Respectively—Description of their Mechanism—How they are Set Up, Kept in Order, and the Impression Regulated.

WE now enter upon the second branch of our subject—practical Presswork. We shall have to deal with a department of the printing office altogether distinct from the composing room; with an entirely different kind or appliances and processes, and to a certain extent with an altogether different class of operatives, whose manners and customs are peculiarly their own.

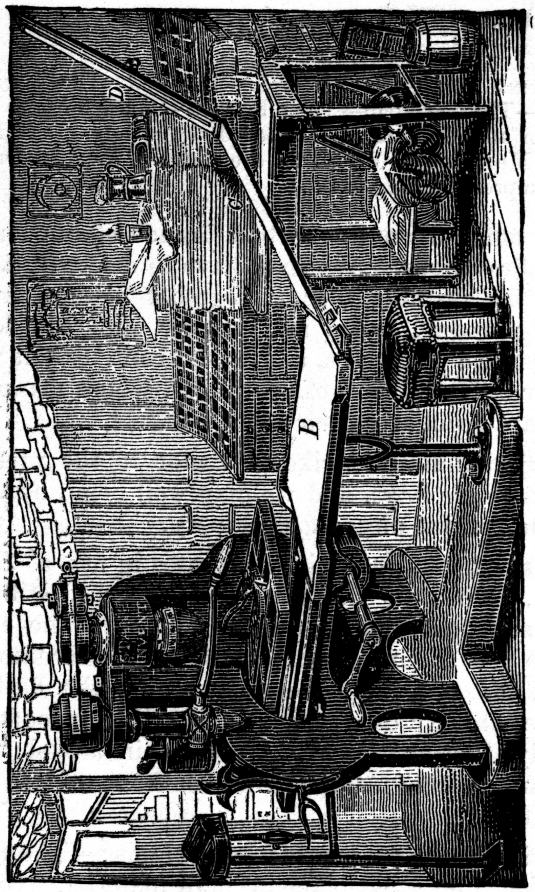
The object that first strikes a visitor to the press-room is, of course, *the press*, and we may well begin by describing that important piece of machinery.

There are several varieties of presses in use at the present day. There is the old wooden press, still to be found in some small offices in London and in the country. There are also the iron Stanhope press, the Britannia, the Imperial, and one or two others; but in the best offices these are chiefly used now for pulling proofs upon,. Practically there are only two presses in actual use, the Columbian and. the Albion; and to these we will confine our attention.

The principle of the press is, briefly, this:—The forme of type is placed on a flat plane of hard material. Over this is another flat plane of iron or other metal, and the latter moves vertically, being always kept parallel to the other. The sheet to be printed, being upon the type, the moving plane approaches and finally comes in contact with it, and the force with which the two come together causes the impression on the paper.

Although this operation seems to be a very simple one, it is not easily accomplished. The difficulty is to keep the upper plane always parallel to the lower, and to get sufficient pressure upon it; for this pressure, coming from above, is only exerted at a certain point in the centre.

The flat plane, upon which the type is laid, is called the *bed of the press*. The flat plane which moves vertically and presses the paper on the type is called the *platen*. These are the two essential parts of the press.



STANHOPE PRESS.

Next in importance are the arrangements for readily bringing a forme under the platen and for withdrawing it.

It is obvious that it would be very inconvenient if the bed were immovable. It is most desirable to have the type forme brought out from the pressing parts, both in order that it may be inked, and that a sheet of paper may be laid upon it. When, too, the

latter is printed, it is desirable to bring out the forme again in order to remove the sheet preparatory to another inking of the forme and the laying on of another sheet.

These requirements led to the table being mounted upon a carriage, which ran upon two rails. A handle and an endless band are attached to the carriage, so that when the handle is turned, the carriage moves, running forward to the place where it is to receive the impression, and, on the handle being again put in movement, running back to the end of the carriage from whence it came.

Another desirable arrangement is to have some means whereby the sheet may be very accurately laid on the type. With this view a kind of leaf is hinged to one end of the bed, and the paper fixed upon it to certain marks, when it is in an upright position. It is then turned down, and the paper comes upon the type in the exact position in which it is wanted.

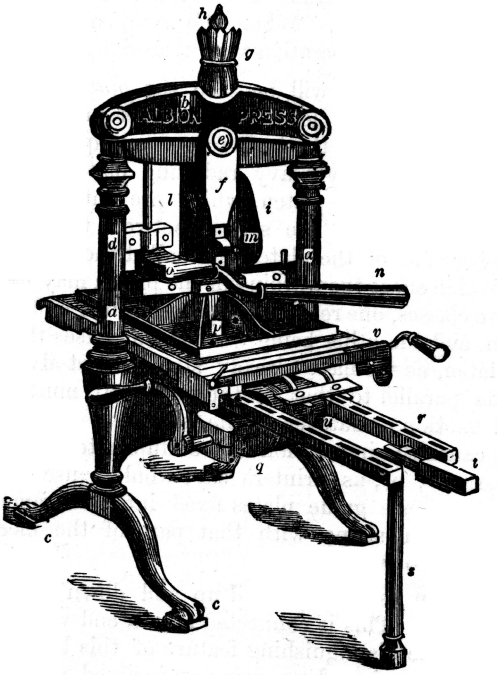
In the press this latter arrangement is called the *tympan* which gets its name from being tightened, like the top of a drum. It consists of a thin frame of wood or metal over which parchment or cloth is stretched. The paper to be printed is laid upon this, and the bottom side of the tympan being jointed or hinged to the bed of the press, it is only necessary to turn it down, in order to bring the paper in contact with the type.

The annexed illustration of the Stanhope Press, reproduced from Johnson's *Typographia*, will serve to make this clearer than any verbal description. A is the plane or "platen" which rises and falls, but always remains parallel to the parts that come beneath it. The plane or "bed" on which the type is laid, is marked *B*. The tympan is marked *C*. The sheet of paper is laid on the side of *C*, facing the platen, and the tympan is turned down flat on *B*, The latter then travels on the two rails until it comes under *A*, and there the type forme receives the impression. The carriage is withdrawn, the tympan lifted, and the sheet removed.

In the illustration is another flap, *D*, hinged upon the tympan. This is called the *frisket*, and its use is to prevent the margins of the paper being soiled, as will be explained hereafter. After the

sheet has been placed upon the tympan, the frisket is folded down upon it and both together are folded down upon the type forme.

Such is a general description of the printing press, omitting, however, that most important point, the source of the power which brings down the platen and causes the impression. This, however, will be best postponed for the moment.



ALBION PRESS.

In the annexed figure of the Albion Press, it will be seen that the works are supported on a frame consisting of two uprights and a cross-piece, *a a*, called the *Staple*; or sometimes only the *frame*. This, as well as the other parts, excepting some which will be named, is of iron. The staple stands on two sets of ornamented *feet*, *c c*, screwed to pieces of wood which stand on the floor. The top is sometimes called the *frame head, b.*

Rather more than half way down the frame there is a crosspiece, on which are laid the *ribs, r*. The latter are the rails on which the carriage travels. At the extremity of the ribs is the rib *leg s*, which serves to steady them, and to support the weight of the carriage. Between the two ends of the ribs furthest from the staple there is the *bolster t*, the object of which is to prevent the carriage running too far out, or off the rails or ribs.

The carriage is driven forward and backward by being attached by two *girths, u*, or strong bands of leather or cloth, to a wooden cylinder called the *rounce, q*. One of these girths is so fixed that it will pull the carriage in one direction, and the other so that it will pull it in the opposite, the cylinder being turned round first so that it will cause the carriage to be impelled towards the platen, and then so as to withdraw it, and send it to the end of the ribs. The rounce is turned by a handle, called the *rounce handle*.

The upper surface of the carriage is covered by a strong plate of iron, planed perfectly level, which is called the *table*, *v*, or the *coffin* or *sole*. The last two terms, however, were chiefly used in reference to the old wooden press, whose table was of stone, and somewhat different in construction.

Hinged to the end of the carriage furthest away from the frame of the press, is the tympan, already referred to. In order, however, to break the force of the descending platen, and ho prevent the type being injured by the impact, the tympan is utilised to contain a soft yielding material such as blanket or cloth, or paper, but which goes by the name of the blanket, whatever it consists of. This is effected by making the tympan to consist of two parts, respectively called the inner and outer tympans. The first is a lighter frame of metal than the latter, and fits into it. The two are fastened together by tympan hooks. At the end of the tympan frame a heavy weight is placed, as a sort of counterpoise. When the tympan is being lifted, this facilitates the operation very materially.

Above these parts will be seen the *platen*, *p*, which is perfectly smooth and level on its under surface, in order-to give the whole

of the type forme an equable pressure. It is strengthened by heavy radiating plates cast in the same piece with the platen, which prevent it from "giving" in any part. The spaces between these plates, on the upper side of the platen, are called the "tills." The parts which effect the working of the platen may be divided into two classes, one regulating its descending and ascending motion, and the other being that which causes the motion. The platen, as we have already stated, must always be in a plane parallel to that of the table. It must have no-lateral motion whatever. The slightest vibration, too, would cause the impression to be duplicated, and destroy its clearness; or, as printers say, would cause a "slur." Hence there are guide plates fixed into the frame, which correspond in shape with that part of the mechanism immediately over the platen.

The platen itself is pushed up and down by means of the *piston, f*. This is connected at one end with a system of levers, the distinguishing feature of this kind of press. The power is gained by causing an inclined piece of steel to become perpendicular. In doing so, the platen is forced down, and the impression takes place at the moment the piece of steel occupies a vertical position. This piece of steel is called the chill, i, and it is shaped like an elbow. At the other end it is fixed to the bar, which, on being pulled towards the operator, straightens the chill, or brings it into the vertical position, and sends down the platen. That part of the frame against which the handle elbow is brought, is called the *cheek, o.* The term is, indeed, sometimes applied to the two sides of the upright frame, to distinguish them from the head. The end of the bar is called the *bar handle, n*. The whole is hung upon the *main bolt, e*, running through the head of the frame.

In order to effect the return of the platen, that is, to raise it up again, there is a powerful spring fixed at the top of the press in the spring box, but obscured by the ornamental erection seen in the view. This spring is connected with the other part by links and steel bolts.

The degree of pressure given is regulated by the *pressure steel, k*,

which is wedge-shaped, and acts upon the chill, on being screwed by the *pressure screws, m,* more or less forward.

The Columbian Press differs from the Albion Press in the nature of the levers which give the impression. The head itself is a powerful lever, acted on by other levers, to which the bar is attached. The platen is attached to the bead by a strong iron bar, and the descent is made steady and regular by two iron girders which project from the cheeks.

In regard to the comparative merits of the two presses, a scientific mechanician, the Rev. A. Bigg, said in a paper read before the Society of Arts in February, 1874:—"For all ordinary work the Albion is light, the pull easy, the pieces few, the mechanism simple, the wear not destructively injurious, and the work rapid. For some years the favours of the working printer were divided between the Columbian and the Albion presses. Such is no longer the case, and estimated by any other standard than that of the value of the old material, the Albion press is superior to the Columbian."[54] The Columbian press is, however, considered by many practical men to work lighter than the Albion; that is, to require leas exertion and strength.

The person who works the press in a printing office is called the pressman. He is expected also to ink the types or roll them, as will be afterwards explained.

Presses are made to certain sizes, and are designated according to the largest sheet they are intended to print. Thus, a double crown press will print any sized forme up to a double crown one. The Albion press, however, always prints one size larger sheet than it is said to be made for; thus, a double crown press will print a double demy sheet.

The following are names of the different kinds of Albion and Columbian presses, and the dimensions of their platens:—

54 We have not thought it necessary to describe the Columbian to detail as it differs so little, except in the leverage and its connections, from the Albion, and the difference will be understood by reading the directions to be given hereafter for setting up the two kinds of presses.

	Inches.		Inches.
Half Sheet Foolscap	15 x 9¾	Royal	26 x 20 ½
Half Sheet Post	16 x 11	Super Royal	29 x 21
Half Sheet Demy	18 x 12	Double Crown	34 x 22 ½
Crown Broadside	21 x 16	Double Demy	36 x 23
Foolscap Broadside	19 x 14½	Double Royal	40 x 25
Demy	24 x 18		

Quarto or Amateur presses are also made. Their platens are 10in. x 7in. These, as well as the half-sheet foolscap, require to be set up on a table or stand.

The best kind of Albion presses have steel chills; the second quality have cast iron chills. The bolts should be of steel, and generally the best iron should be used.

It is advisable that each press should be supplied with an extra spring, in case of accident.

Presses are made for travelling purposes in which the frame or staple, the most cumbrous part, is made in two pieces.

How to set up a Press.—Every printer should know how to set up and take down a press; not only in order that he may be able to remove different parts when they require cleaning, but also that he may clearly understand its mechanism. We will, therefore, give as clear directions for this operation as possible.

To set up the Albion Press.—Put the feet on the frame to their respective marks. Then screw the ribs on the frame with the bolts, nuts, and plates that are supplied with the press. There are two bolts and nuts for securing the rib leg and the bolster, and these must next be inserted.

Place the table upon the ribs, and fix the rounce in its bearings under the ribs, after which suspend the piston by passing the main bolt through it and through the hole in the frame head. Next put the spring box upon the head of the press with the spring and spring bolt in it. Now connect the spring bolt with the brass links of the piston, by passing the long flat steel bolt

through them. After this put in the chill and pass the main bolt through the holes at the top of the piston, passing it through the chill as well as through the hole in the frame head, which will keep the chill in its place. Put in the pressure steel with its bright side to the front; then connect the joint and rod to the chill, and then the bar handle, and secure the small staple, which has the screw and nut in it, to the back of the frame behind the elbow-piece of the bar handle, by which you will be able to stop the bar handle at a shorter pull if required. Place the platen upon the table, and put the four notched head bolts into the holes, as marked, and drive in the four wedges to keep the bolts from slipping back. Lift the platen and pass the screwed parts of the bolts through the four holes in the piston and put on the nuts. Screw down the nut on the top of the spring till it brings the bar handle back.

Let a forme now be placed on the table and run it under the platen. Make a pull with the bar handle so as to bring the platen fair with the face of the table. If necessary, put one or more of the thin square pieces of iron between the piston bottom and the top of the centre of the platen. Tighten up the four nuts of the platen bolts, a little at a time, so as to tighten them regularly.

Should the platen not come fair with the face of the table, slacken one or more of the nuts which secure the platen to the piston on that side which is farthest from the table, and tighten up the nut or nuts on that side which is nearest the table, by which means it can easily be got fair, and prevent mackling or slurring.[55] Should the platen and table not range fair, slacken the nuts which secure the ribs to the frame, and the ribs may be moved a little on either side as the case may require. Afterwards tighten up the nuts again.

The press is working to its full power when the bar handle stops against the cheek of the frame, which it should always do, particularly in heavy formes.

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55 Mackling is an imperfection in the printed sheet, part of the impression appearing double.

To clean the press, put one end of a short bar on the round part of the piston when the bar handle is pulled home, and the other end under the head of the press; then push back the bar handle, and it will leave the chill and pressure steel quite disengaged. Knock the connecting rod pin and the main bolt a little, and they may be taken out.

The main bolt should be taken out about once a week and well cleaned and oiled, which is easily done at any time. All that is necessary is to take out the pin at the back and knock it out.

The small holes which communicate with the respective bolts require a small quantity of oil occasionally, and the use of the purest Florence flask oil is recommended as the cheapest in the end. It is easy to judge whether everything is in its proper place by the perfect ease with which the bar handle moves.

In beginning to work a new press, let the impression be-rather light, and increase it gradually, until such an impression as is desired is obtained. Variations of pressure are effected by means of the wedge in the chill. The further this wedge is driven in, by turning the screw, the more pressure will be obtained. If the pressure is too great, turn the screw the reverse way.

To set up the Columbian Press.—Put the feet on the frame or staple in their proper places, and erect the staple upon them. Next fix the bar handle to the side of the frame, together with its proper bolt. Put the principal lever in its place, and then put in the bolt which connects it with the staple. Put the angular or crooked part (which has one square and three round holes) through it in the mortice, which will be found in the projecting part of the long side of the staple. Now place in the bolt that, attaches the angular part to the staple.

There are marks in the extremity of the edges of the heads of these two last-mentioned bolts, and corresponding marks over the holes through which they pass. Put the bolts in so that these marks meet together and correspond; and so on, until all the remaining parts are in their respective places.

The four screws for the platen, which have heads on one side,

are intended to attach the platen to the piston, which, being placed in their respective places, are secured by the four small blocks of iron, which are supplied with the press.

To decrease the power of the press, turn the nut in the rod so as to shorten it, and to decrease the power turn it the contrary way.

The ascent and descent of the platen are regulated by the nut or iron screw which connects the main and top counterpoise levers. This nut must be screwed up as is necessary to clear the tympan when the carriage is run in.

To adjust the platen so as to make it approach the forme exactly parallel, place a forme on the platen. Then square the platen to the tympans, make a pull, and hold the bar handle back, [56] while an assistant screws the four platen screws equally tight.

The impression may be increased by placing thin piece[57] of tin or sheet-iron cut to the size of the plate of iron which lies between the platen and the piston (secured by the four screws on the top of the platen), and placing it under the piston. As in the case of the Albion press, the ease with which the bar handle moves is the criterion of everything being in its place.

56 In printers' phraseology, "pull the bar home."

57 For very fine work other materials are occasionally used, such as silk. Reference to this point will be made hereafter.