They may be divided into two classes,—those worked entirely by keys or notes, like the pianoforte, and those in which the distributing is to a certain extent done automatically. For the former class only the type in ordinary use in printing offices is required. For the latter the type requires to be specially prepared, each character having a distinctive nick or nicks upon it, which correspond with the particular channel of the machine it is intended to occupy, and by which it is guided to its special compartment. Kastenbein has produced a distributor which may be described as a composing machine reversed. The matter to be decomposed is placed at the top in its appropriate tray or fixed galley, the sides of which are adjustable to fit any measure, the back being so constructed that it may be advanced to keep the matter always up to the front. As the matter is pressed towards the front, the first letter of it is brought in contact with a steel pusher, behind it being an aperture com­municating with the channel of the guide plate. The matter is read by the operator ; and he touches the key corresponding to the letter that comes first. Thus the types are conveyed one by one to the guide plate or conductor. It has grooves furnished with little gates or switches, like the points of a railway, and these direct the types into their proper channels. The tubes into which the types are deposited are placed at the foot of each groove. Thus every time a key is depressed the switches move, the pusher sends the type to be distributed out of the line, it falls through the aperture, and, passing down the channels in the guide plate, reaches the proper tube. The speed is to a certain extent depend­ent upon the skill of the operator, but averages be­tween 3500 and 4000 per hour. A good compositor can by hand alone distribute as many letters as this. But for the purposes of the composing machine, hand distributed types would have to be set up again, as the composing machine is supplied not from ordinary cases but from tubes of type. In the Fraser dis­tributing machine (fig. 9) the page of matter to be distri­buted is placed on the upper part of the machine at H, whence by suitable apparatus it is moved line by line towards the separator I in front. The matter is there read by the operator, and as each letter comes in contact with the separator the corresponding key is pressed and the type is conveyed to the guide plate, where a series of switches guide it to its proper compartment in the tray of the composing machine.

*Stereotyping, Electrotyping, &c.*

The method of reproducing and multiplying letter-press printing surfaces by taking casts of them, or stereotypes, has greatly con­duced to the progress of typography,—much more so, indeed, than might be realized by those who are unacquainted with the practical details of the art. Stereotyping (στερ∈ός, fixed or solid ; τύπoς, type or forme) is the method of taking casts from a fixed or mov­able forme ; thus, printing from stereotypes is distinguished from typography, in which impressions are taken from movable types. It does not supersede type-founding, but supplements it, for a page of reading matter requires first of all to be set up letter by letter, and then the casts or plates are taken, each of which may be printed from with nearly as much perfection as from the original forme. Hence a printing surface may be reproduced to an almost infinite extent, and the means of production of impressions on the press or machine are increased in proportion to the number of casts taken. It ensures an accurate copy of an original text, whereas in repro­duction by resetting the movable types there is a liability to devia­tion. When only a cast is worked from, any accident may be re­paired by taking another cast, and the cost is slight compared with that of composing over again. A smaller quantity of type may be used in an office where this process is used ; a portion of a work may be set up, a cast taken, and the types returned to the cases. The plates are more easily stored than movable formes, and are not liable to the danger, as in the latter, of types falling out. Above all, the mould may be bent to any curve required, and a circular cast obtained, which may be fastened round the cylinder of a machine (see *infra* in regard to rotary printing).

The process of stereotyping, divested of merely technical details, is as follows. From a forme of matter, which may be wholly or in part composed of movable types, a matrix or mould is taken. The original is in rilievo ; the mould consequently is in intaglio. From this the stereo plate is cast, and it of course is again in rilievo. This in turn may likewise become an original, and casts may be taken from a plate, or other casts from the same mould. The first books were printed from solid wooden blocks, each of which formed a page. Then came the era of typography, in which these pages were composed, mosaic-like, of movable types. Now has succeeded the period of stereotyping, in which pages formed of single blocks —but of metal, not of wood—are used. The two essential parts are, therefore, the making of the matrix and of the cast, which is com­posed of an alloy something like that for type metal. The mould may be of plaster of Paris or papier-mâché ; the latter being the simplest material, and that almost universally used, need alone be here referred to. The following account of the process, when carried out on the smallest possible scale, is sufficient perhaps to show the general principles of the art. The papier-mâché for the mould, called *flong,* is made by uniting several sheets of paper with a paste made of wheaten flour, starch, and alum, to which whiting is added. These ingredients are often varied ; the general object in using them is to obtain a paste which will stand a high temperature without burning. A sheet of brown paper is laid down on a smooth surface and pasted over ; blotting paper is laid on that and pressed down, then pasted over, and a sheet of tissue paper added, which is also pasted, and another sheet of tissue paper placed on the top. This is well smoothed and pressed to give the incorporated material greater firmness and cohesion. Next, to prepare the forme for being moulded, it is surrounded with metal “clumps” of the height of the type, placed close to the matter, and then oiled to prevent the flong sticking to it. The latter is then thoroughly damped, to render it quite plastic. The forme being on a level surface, the flong is laid upon it, and on that a piece of linen. The surface is next well beaten all over with a long-handled brush, till the flong sinks into all the declivities of the forme and receives a deep impression of it. This is a process requiring experience and practice. The linen being removed, a piece of very stout paper is laid on the top, and also beaten down, so as to strengthen the flong, and the moulding is finished. The next point is to dry the mould.

In the most rudimentary method a combined drying and casting press is used. It consists of a flat iron surface, with a lid attached to one end by hinges. Over the surface is a cross-head fitted with a screw ; pressure may be exerted on anything placed between, the arrangement being like that of a screw letter-copying press. The cross-head can be moved to one side when it is necessary for the lid to be lifted up. Underneath the press is a series of gas jets, by means of which the bed plate is heated. The press stands on supports, but is attached to them only by an axle, and it can be readily changed from the horizontal to the vertical position. The lid of the box is raised and the forme with the flong upon it placed on the centre of the iron surface. After being covered with a blanket, the lid is screwed down upon the whole, and, the gas being lighted, the forme and mould are heated for a few minutes, after which the lid is raised, the steam evaporates, and the flong, which has now become the matrix, is thoroughly dry. In large stereotyp­ing foundries, after the flong has been well beaten upon the forme, until the impression of the types is plainly seen on the back, it is baked and dried (the forme still underneath) on a long thick iron slab, called a *hot chamber,* because it is heated from within by steam. The matrix is then removed from the forme, and any superfluous margin cut away or trimmed ; after this the matrix is dusted with powdered French chalk and is ready for being cast from.@@1 A method has lately come into use for obviating the necessity of keeping the matrix on the type while it is being hardened by drying by heat, whereby the type is injured. The matrix is dried separately, being removed when moist from the forme, as soon as the impression is obtained. It is then placed on a bed of sand heated by gas. The forme is never heated, and there is a great saving of time, because the drying can be done in two minutes. The matrix is laid on the bed of the casting box face upwards, with gauges around it to de­termine the height or thickness of the cast. The lid is put down and screwed tightly, and the position of the press altered from the horizontal to the upright. The metal is then poured in and the press restored to its former position. The matrix is carefully raised and the plate exposed. It has only to be “trimmed,” the super­fluous metal cut away, and the back planed, to be ready for mount­ing on a block of wood to make it type high.

In stereotyping for the Walter and similar presses the process is as follows. The forme is laid on the table of the moulding machine and the flong placed on it and thoroughly beaten in by hand or passed through a moulding machine, which performs the same operation. The forme is next placed on a heating surface, and when nearly dried the matrix is removed from it and again dried. It is then placed in the casting box, which is curved to the circumference of the cylinder of the press. The box, being on a swivel, is set upright. The metal is now poured in from a ladle and the plate cast. It is allowed to stand a minute and then taken out, still hot, and placed upon a “ finishing saddle ” of the same circular form as the back of the plate, and secured by clamps and screws. An angular-shaped knife or chisel, fixed in a carri­age, is moved by a handle in a semicircular direction across the surface of the plate, in order to remove superfluous portions of metal and to form a bevel whereby the plate can be subsequently

@@@1 These matrices can be preserved for several years, and the stereotyping pro­cess postponed until actually required.