

The principal works on the calendar are the following:—Clavius, *Romani Calendarii a Gregorio XIII. P. M. restituti Explicatio*, Rome, 1603; *L'Art de vérifier les Dates*; Lalande, *Astronomie*, tom. ii.; *Traité de la Sphère et du Calendrier*, par M. Revard, Paris, 1816; Delambre, *Traité de l'Astronomie Théorique et Pratique*, tom. iii.; *Histoire de l'Astronomie Moderne*; *Methodus technica brevis, perutilis, ac perpetua construendi Calendarium Ecclesiasti-*

cum, Stylo tam novo quam vetere, pro cunctis Christianis Europæ populis, &c., auctore Paulo Tittel, Göttingen, 1816; *Formole analitiche pel calcolo della Pasqua, e correzione di quello di Gauss, con critiche osservazioni ed quanto ha scritto del Calendario il Delambri*, di Lodovico Ciccolini, Rome, 1817; E. H. Lindo, *Jewish Calendar for Sixty-four Years*, 1838; W. S. B. Woolhouse, *Measures, Weights, and Monies of all Nations*, 1869. (T. G.—W. S. B. W.)

CALENDER, a mechanical engine employed for dressing and finishing cloths and various descriptions of fabrics, preparatory to sending them into the market. It is also used by calico-printers to prepare the surface of their cloths for the operations of printing. The first object of calendering is to produce in the cloth as perfect extension and smoothness of surface as can be attained,—so that no wrinkle or doubled folding may remain in it. The second end attained by the calendering of cloth is the compression of the yarn or threads of which the texture is composed, which in some degree divests them of their cylindrical shape, and reduces them to a degree of flatness, which, by bringing them more closely into contact with each other, gives to the fabric a greater appearance of closeness and strength than it would otherwise possess. The operation of the calender also improves the superficial appearance, by flattening down all knots, lumps, and other imperfections, from which no material from which cloth is fabricated can ever be entirely freed during the previous processes of spinning and weaving. And, thirdly, in certain fabrics it is desirable that cloth should receive, by means of friction, an additional lustre or polish, which is distinguished by the appellation of glazing. For the accomplishment of these objects the agencies on which the calenderer has to rely are moisture, heat, pressure, and friction, and these he variously combines to produce many different effects.

The term calender, which really means only the chief mechanical engine employed, gives the general name to the finishing establishments where all the varied operations of cloth-lapping are carried on; and it is as usual to say that goods are *packed* as that goods are *dressed* at a calender. The common domestic smoothing-iron may be regarded as a form of calendering utensil; as is also the old-fashioned domestic mangle, which consists of a cylinder applied to a plane, upon which it is rolled backward and forward, until some degree of smoothness is produced by this reciprocating motion. A form of mangle, consisting of an enormously heavy cylinder, which is worked forwards and backwards over a plane surface, is still used in calendering establishments for the finishing of very heavy lineens and similar goods.

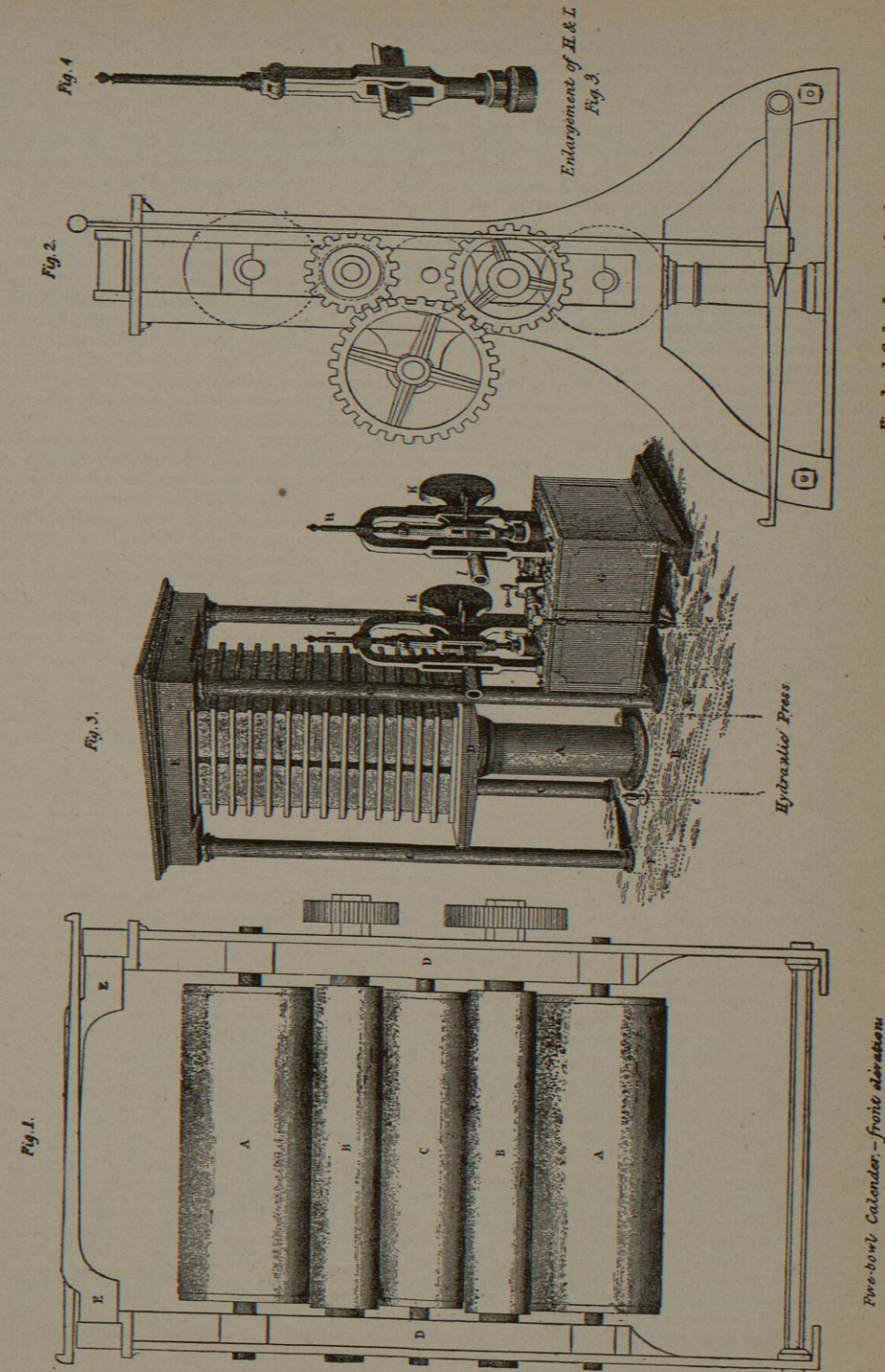
The smoothing calender completes the substitution of cylindrical for plane surfaces, all the parts which operate upon the cloth being of that form. This ingenious engine, which was introduced into Britain from Flanders and Holland during the persecution of the Huguenots, has, since its introduction and adoption, undergone no very material or important alteration or improvement in point of theoretical principle; nor, until the extension of the cotton manufacture had introduced a general spirit of mechanical improvement, were any great advances made in the practical applications of it.

Calenders are constructed with from two to five rollers or cylinders, technically termed "bowls,"—three or five-bowl calenders being most frequently employed. The materials of which these cylinders are made are wood, compressed paper, and metal, such as chilled cast-iron, brass, or copper. They are variously arranged in relation to each other, and as mechanical arrangements are required—1st, for varying pressure; 2d, for applying heat within a metal bowl from steam, hot iron, or burning gas;

and 3d, for varying the rate of motion of a pair of the bowls so as to produce friction—the gearing of a calender is somewhat complex. Commonly a three-bowl calender has an upper and under cylinder of paper, the central one being of metal, and in such an implement either two pieces may pass through at the same time, or one piece may receive two pressures. An ordinary five-bowl calender has the first, third, and fifth cylinders of paper, the intermediate being of metal, and here four successive pressures may be given. Fig. 1, Plate XXXII, is an elevation of a five-roller calender for finishing cloth. A, A are two paper rollers, of 20 inches diameter each. B, B are two cast-iron cylinders, externally turned until perfectly smooth; their diameter is 8 inches, allowing the substance of iron to be 2 inches, and leaving a perforation of 4 inches diameter. C is a paper roller of 14 inches diameter; D, D is the framing of cast-iron for containing the bushes in which the journals of the rollers revolve; E, E are two levers by which the rollers are firmly pressed together while the cloth is passing through.

Fig. 2 is an end view of the same calender, with the wheels for glazing cloth. The wheel on the upper cylinder is 10 inches diameter, the wheel on the under cylinder is 13 inches diameter; they are connected by the wheel F, which communicates the speed of the upper cylinder, so that the wheel on the under cylinder being nearly one-third of an inch more in diameter, the difference of their motions retards the centre paper roller, by which means the upper cylinder passes over the cloth one-third faster than the cloth passes through the calender, and polishes it in consequence.

The construction of paper or pasteboard rollers for calenders is a process of great interest and importance. The frequent heating and cooling to which the apparatus is subject necessarily produces warping and splitting in wooden bowls, which are thereby rendered useless, but the substitution of paper afforded a radical cure for these defects as well as a collateral advantage arising from its being susceptible of a much higher degree of superficial polish, which is always transferred to the cloth. In the construction of paper cylinders an axis or journal of malleable iron and two circular plates of cast-iron of the same diameter as the cylinder to be made are, in the first place, provided. A plate is secured on one end of the journal. The entire space between the two iron plates is then to be filled with circular pieces of paper or pasteboard, exceeding by about 1 inch in diameter the iron plates, and having each a correspondent perforation, through which the iron journal passes. A cylinder is thus formed, the substance of which is of paper locked together by plates of iron at the extremities, and susceptible of immense compression which it receives in a hydraulic press. After undergoing this preparation, the cylinder is exposed to strong heat in a confined apartment in which the paper contracts and becomes loose. It is again put into the press, more sheets of paper are added, and this process goes on till the cylinder has gradually acquired the requisite compression. It is then re-exposed to the ordinary temperature of the atmosphere, and by its re-expansion presents a body almost remarkably compact, its specific gravity in this state being greater than even that of silver.



Five-bowl Calender—front elevation

Five-bowl Calender—side elevation

The only operation now required is that of turning its superficies until correctly cylindrical; and this is a work of immense labour and patience.

For dressing muslins, gauzes, lawns, and other goods of a light kind, a smaller species of calender is employed. It consists of only three cylinders of equal diameter (generally about 6 inches), and is easily moved by a common winch or handle. The middle cylinder is iron, and the others are of wood or pasteboard. All the cylinders are of equal diameter, and are moved with equal velocities by means of small wheels. This machine is always used in a cold state.

By means of the calender, also, is produced the waved or watered surface, known as *moiré* among the French, and best seen in the silk textures called *moire antique*, and in woollen moreens. The effect is produced in a variety of ways, the principal method employed consisting of passing two webs laid above each other through the calender at the same time. The threads of the web not running perfectly parallel to each other are at some places superimposed, and at other points they fit into alternate spaces,—the result being that at the places where the threads press directly on each other a higher gloss is produced, which gives the watered appearance to the texture. Watering is also effected on a single thickness of material by moving the web to the right and left as it enters the calender, and thus varying the direction in which it travels over a bowl on which there are a series of engraved lines running in a parallel direction. Embossed patterns, or imitations of the grain of leather, &c., for bookbinders' cloth, are produced by means of a calender having a bowl of brass or other metal on which the pattern is engraved. When a paper cylinder is used along with an embossing cylinder, the paper must be turned into such exact proportion to the embossed bowl that it will repeat the pattern accurately on its circumference, so that the depressions on the one bowl always fit accurately into the elevations on the other. For many purposes a covering of leather, felt, or lead is used for the cylinder which works against that on which the pattern is engraved.

Goods after passing through the calender are folded, either by machinery or on long pins by hand-working into a variety of forms according to their nature and destination, and when so folded they are submitted to a very powerful compression either in a screw-press or in an hydraulic press.

Fig. 3, Plate XXXII, is a perspective view of an hydraulic press. A is the piston, 8 inches diameter, working in the cylinder B, and kept water-tight by passing through a collar of leather; D, a cast-iron plate raised by the piston A, between which and the entablature E, E the goods to be pressed are laid; C, C, C, C, four malleable iron columns, 2½ inches diameter, having screwed ends, with nuts, by which the entablature and the base F, F are firmly connected together; G, a cistern for holding water to supply the two force-pumps H and I, the largest of which has a piston 1½ inch diameter, and the other one of ¾ inch diameter, which is used to give the highest pressure; K, K, weights to balance the pump-handles which fit into the sockets at l, l. The pistons of the force-pumps are made water-tight by collars of leather, kept in their place by the screwed pieces m and n. e, e, e is a pipe communicating with the pumps and the large cylinder B; there is a stopcock at f, which shuts this communication when required.

Fig. 4 is an enlarged view of the force-pump piston, to show the method of keeping the rod parallel.

An illustration of a glazing calender as used by bleachers and calico-printers, with further details as to finishing processes, will be found under BLEACHING. See also CALICO-PRINTING.

CALEPINO, AMBROGIO (1435-1511), an Augustine monk, born at Bergamo in 1435, was descended of an old family of Calepio, whence he took his name. He devoted his whole life to the composition of a polyglott dictionary, first printed at Reggio in 1502. This gigantic work was afterwards augmented by Passerat and others. The most complete edition, published at Basel in 1590, comprises no fewer than eleven languages. The best edition is that published at Padua in seven languages in 1772. Calepino died blind in 1511.

CALHOUN, JOHN CALDWELL (1782-1850), a leading politician of the United States, was grandson of an Irish Presbyterian, who founded Calhoun settlement, in the district of Abbeville, South Carolina. It was there that John Calhoun was born in 1782. For some years he assisted his widowed mother in the management of her farm, but at the age of eighteen he commenced to study for the bar. He graduated with honours at Yale College, and spent eighteen months at Litchfield, at that time the only law school in the country. He then returned to practise in his native district of Abbeville. While there, in June 1807, the searching of the Chesapeake having aroused strong feeling in America, Calhoun drew up for a public meeting a resolution expressive of indignation against Great Britain, and supported it in a speech of such power that he was soon after elected a member of the legislature, and in November 1811, became member of Congress, where he continued to be an enthusiastic and prominent adherent of the war party. For seven years (commencing with 1817) he acted with credit as secretary of war under Monroe; in 1825 he became Vice-President of the United States under J. Quincy Adams; and in 1829 he was re-elected under General Jackson. He now began to be looked upon as champion of the South; and, though he had supported the protective tariff of 1816, he became an eager advocate of free-trade,—that policy being, even popularly, recognized as specially advantageous to the cotton-growing States. He is, however, best known as a strenuous defender of slavery, and as the author of a doctrine to which the Civil War may be traced,—the doctrine of "nullification," according to which each State has the right to reject any act of Congress which it considers unconstitutional. This view was in 1829 adopted by the legislature of his native State, and drawn up in a document, mainly prepared by Calhoun, which was known as the "South Carolina Exposition," and which was approved by Virginia, Georgia, and Alabama. In 1832 the legislature of South Carolina carried the theory into practice by passing laws nullifying the obnoxious tariff of that year; but its opposition was crushed by the firmness of General Jackson, who declared that he would resort to force, if necessary. The most important of the other political acts of Calhoun are his defence of the right of veto which belongs to the president, his advocacy of the annexation of Texas, and his maintenance of the cause of peace, when war with Great Britain was threatened by the claims of the United States to Oregon. He died at Washington on the 31st March 1850. His works, with memoir, were published posthumously in 6 vols. in 1853-4, by Richard K. Cralle, who had been his amanuensis. They include a dissertation *On the Constitution and Government of the United States*; and from this book we learn that he advocated the election of two presidents, one by the free and another by the slave States, the consent of both of whom should be essential to the passing of any law. Calhoun's speeches were always directly to the point, clear, and forcible, while he seldom indulged in the imaginative or purely rhetorical. The integrity and worth of his character have been spoken of in the highest terms even by political opponents.