thread and with heated waxed thread was a comparatively simple task. The first important step in the more difficult problem of sewing together soles and uppers by a machine was taken in the United States by Lyman R. Blake in 1858. Blake’s machine was ultimately perfected as the McKay sole-sewing machine—one of the most successful and lucrative inventions of modern times. Blake secured his first English patent in 1859, his invention being thus described: “This machine is a chain-stitch sewing-machine. The hooked needle works through a rest or supporting surface of the upper part of a long curved arm which projects upwards from the table of the machine. This arm should have such a form as to be capable of entering a shoe so as to carry the rest into the toe part as well as any other part of the interior of it; it carries at its front end and directly under the rest a looper, which is supported within the end of the arm so as to be capable of rotating or partially rotating round the needle, while the said needle may extend into and through the eye of the looper, such eye being placed in the path of the needle. The thread is led from a bobbin by suitable guides along in the curved arm, thence through a tension spring applied to the arm, and thence upwards through the notch of the looper. The needle carrier extends upwards with a cylindrical block which can be turned round concentrically with it by means of a handle. The feed wheel by which the shoe is moved along the curved arm during the process of sewing is supported by a slider extending downwards from the block, and applied thereto so as to be capable of sliding up and down therein. The shoe is placed on the arm with the sole upwards. The feed wheel is made to rest on the sole.” Blake’s original machine was very imperfect and was incapable of sewing round the toe of a shoe; but a principal interest in it coming into the hands of Gordon McKay (1821-1903), he in conjunction with Blake effected most important improvements in the mechanism, and they jointly in 1860 procured United States patents which secured to them the monopoly of wholly machine-made boots and shoes for twenty-one years. On the outbreak of the Civil War in America a great demand arose for boots, and, there being simultaneously much labour withdrawn from the market, a profitable field was opened for the use of the machine, which was now capable of sewing a sole right round. Machines were leased out to manu­facturers by the McKay Company at a royalty of from ½ to 3 cents on every pair of soles sewed, the machines themselves registering the work done. The income of the association from royalties in the United States alone increased from $38,746 in 1863 to $589,973 in 1873, and continued to rise till the main patents expired in 1881, when there were in use in the United States about 1800 Blake- McKay machines sewing 50,000,000 pairs of boots and shoes yearly. The monopoly secured by the McKay Company barred for the time the progress of invention, but still many other sole-sewing machines were patented. Among the most important of these is the Goodyear welt machine—the first mechanism adapted for sewing soles on lasted b∞ts and shoes. This machine originated in a patent obtained in 1862 in the United States by August Destory for a curved-needle machine for sewing outsoles to welts, but was not successful till taken in hand by Charles Goodyear, son of the well- known inventor in indiarubber fabrics. This device was first applied in a machine for sewing turn shoes. Later it was used in a machine which sewed with a chain-stitch from the channel of the insole through the welt and upper, and a little later still it was followed by the “ rapid outsole lock-stitch machine,” which united the outsole to the welt with lock-stitching. Improvements have been continually effected in the Goodyear system and numerous accessory mechanisms have been brought out, until there is now not a single operation necessary in shoemaking, however insignificant, for which machinery has not been devised. In consequence the range of machines employed in a modern shoe factory is very extensive, the various operations being highly specialized, and there being minute subdivision of labour. Through the fundamental principles were not in all cases of American origin, American inventors were foremost in developing such machinery, and America took the lead in employing it to the supersession of handwork in shoemaking. When English makers, in about the seventh or eighth decade of the 19th century, were forced by the pressure of economic necessity to do the same, they found that the suitable machinery was controlled by American makers, from whom therefore they had to hire it on the payment of royalties and under stringent conditions which rendered it difficult for them to use machines of any other maker, even if available, on pain of the whole plant being stripped from their factories. The British United Shoe Machinery Company, the English branch of the United Shoe Machinery Company, of Boston, Mass., thus maintained a practical monopoly of the supply of shoemaking machinery in Great Britain. However, by the begin- ning of the 20th century English makers began to assert them­selves and to show that they could produce machines able to com­pete effectively with those from America. The loosening of the American monopoly thus begun was aided by the Patent Act of 1907, section 27 of which provided that a patent may be revoked if the article is not manufactured “ to an adequate extent ” in Great Britain (most of the shoe machinery in question having been manufactured in America), while section 38 prohibits the insertion in a lease of conditions excluding the lessee from using articles or processes not supplied or owned by the lessor.

*Rubber Shoes.—*The manufacture of indiarubber galoshes,@@1 shoes, fishing boots, &c., forms an important branch of the indiarubber industry, especially in America, where rubber overshoes, colloquially known as “ rubbers,” are extensively worn, and where fully 1000 different shapes and sizes are said to be produced. So far back as 1833 the Roxbury lndia Rubber Company was constituted to work the discovery that indiarubber dissolved in turpentine and mixed with lampblack formed a varnish which gave a hard waterproof surface when applied to leather, but the process failed because the varnish melted with heat and cracked with cold. This defect was remedied by Charles Goodyear (1800-1860), who found that when sulphur was combined with the rubber by the aid of heat the product (“ vulcanized rubber ”) was not only stronger but retained its elasticity through a wide range of temperature. His patent, taken out in 1844, was the foundation of various American rubber indus­tries including that of rubber boots and shoes. Guttapercha has also been used instead of leather for the outer soles of boots.

**SHOE-BILL,** a huge African bird from the White Nile, the *Balaeniceps rex* of ornithology, now regarded as a giant heron. It was first brought to Europe by M. Parkyns and described by J. Gould in the Zoological *Proceedings* (1851, pp. 1, 2, pl. xxxv.) as an abnormal pelican. This view was disputed by Reinhardt *(op. cit.* 1860, p. 377), and wholly dispelled by W. K. Parker in the Zoological *Transactions* (iv. pp. 269-351), though these two authors disagreed as to its affinities, the first placing it with the storks, the last assigning it to the herons. In singularity of aspect few birds surpass *Balaeniceps,* with its gaunt grey figure, some 5 ft. in height, its large head surmounted by a little curled tuft, the scowling expression of its eyes and its huge bill in form

@@@l The galosh or golosh was originally a wooden shoe or clog, but later came to mean an overshoe (cf. R. Holme, *Armoury,* 1688: “ Galloshios are false shoocs, or covers for shooes ”). The word is adapted from the French *galoche,* from Low Lat. *galopedium,* a wooden shoe, Gr. καλοπόβιον, shoemaker’s last, from *καλov,* wood, and tγovj, foot.