found in the granulites of Saxony and Bohemia, is known as her­cynite from the Hercynian Forest. A zine-spinel (ZnAl2O4), occurring in talcose slate near Falun in Sweden, is named gahnite, after its discoverer J. G. Gahn; whilst it has also been termed automolite from Gr. *αὐτόμoλoς,* a deserter, in allusion to the occurrence of zinc in a mineral where if was unexpected. The group of spinellids includes, as its extreme members, magnetite (Fe"Fe2"O4) and chromite (FeCr2O4) (*q.v*.). (F. W. R.\*)

**SPINELLO ARETINO** (*c*. 1330—*c*. 1410), Italian painter, the son of a Florentine named Luca, who had taken refuge in Arezzo in 1310 when exiled with the rest of the Ghibelline party, was born at Arezzo about 1330. Spinello was a pupil of Jacopo di Casentino, a follower of Giotto, and his own style was a sort of link between the school of Giotto and that of Siena. In the early part of his life he worked in Florence as an assistant to his master Jacopo while painting frescoes in the church of the Carmine and in Sta Maria Novella. Between 1360 and 1384 he was occupied in painting many frescoes in and near Arezzo, almost all of λvhich have now perished. After the sack of Arezzo in 1384 Spinello returned to Florence, and in 1387-1388 with some assistants covered the walls and vault of the sacristy of S. Miniato near Florence with a series of frescoes, the chief of which represent scenes from the life of St Benedict. These still exist, though in a sadly restored condition; they are very Giotto-like in composi­tion, but have some of the Siena decorative brilliance of colour. In 1391-1392 Spinello was painting six frescoes, which still remain on the south wall of the Pisan Campo Santo, representing miracles of St Potitus and St Ephesus. For these he received 270 gold florins. Among his later works the chief are the very fine series of frescoes painted in 1407-1408 on the walls and vault of a chapel in the municipal buildings of Siena; these also have suffered much from repainting, but still are the finest of Spinello’s existing frescoes. Sixteen of these represent the war of Frederick Barbarossa against the republic of Venice. Spinello died at Arezzo about 1410.

Spinello’s frescoes, are all strong and highly decorative works, drawn with much spirit, and are very superior in style to his panel pictures, many of which appear to be mere *bottega* productions. The academy of Florence possesses a panel of the ” Madonna and Saints,” which is chiefly interesting for its signature—“ Hoc opus pinxit Spinellus Luce Aritio D.I.A. (1391).” The easel pictures which are to be found in the various galleries of Europe give little or no notion of Spinello’s power as a painter.

**SPINET,** or Spinnet (Fr. *espinetie* or *épinette*; Ger. *Spinett*;Ital, *spinetta),* names given in England to all small keyboard instruments irrespective of shape, having one string to a note, plucked by means of a quill or plectrum of leather. The earliest name recorded for this instrument is clavicymbalum, which occurs in the rules of the Minnesingers (1404), and also in the *Wunderbuch* (1440), a MS. preserved in the grand-ducal library at Weimar. This is enriched with pen and ink sketches, amongst which is a series of musical instruments comprising a clavi­cymbalum, not represented as the rectangular instrument figured by Virdung and Luscinius, but harp- or wing-shaped like the larger and more perfect instrument afterwards know,n as harpsi­chord in England (clavecin, clavicymbel).

In Italy the usual early model of spinet was pentagonal or heptagonal, and was generally enclosed in an outer case, from which it was taken for performance. Some of the oldest rect­angular specimens merely contain a pentagonal spinet, the corners not being filled in. In the 16th century the rectangular spinets were modelled in Italy on the *cassone* or wedding coffers, and the keyboard, until the middle of that century, stood out from the case, Rosso of Milan being the first to recess it. Both forms were in use in England until the Restoration, when the transverse or wing form became popular in England, Haward, Stephen Keene and Thomas Hitchcock being the most cele­brated English makers@@1 at the end of the 17th and beginning of the 18th century.

The mechanism of all spinets, virginals and harpsichords is the same in principle, the principal variation being in the number of strings to each note and the manner in which they

are disposed over the soundboard. In the spinets they run parallel or at an obtuse angle to the keyboard. The jack rests on the back of the key-lever, and works through a rectangular hole cut through the soundboard as the key is depressed. The quill or plectrum is embedded in a pivoted tongue near the top of the jack in such a manner that when the tongue is at rest the quill protrudes at right angles just under the string. As the jack rises the quill catches the string and twangs it, causing the tongue, kept in place by a bristle spring, to fall back and thus avoid the string on the return of the jack. A little piece of cloth acting as a damper and attached to the jack rests on the string whenever the key returns to its normal position.

(k.s.)

For the history of the spinet, see Pianoforte.

**SPINNING** (from O. Eng. *spinnan,* to spin, cf. Ger. *spinnen,* &c., the Teut. root is *spcn,* to draw out, cf. span, spider), the forming of threads by drawing out and twisting various fibres. There is ample evidence of the great antiquity and wide diffusion of the art of spinning, for spinning necessarily precedes weaving (*q.v.)* whenever short fibrous materials have to be made into threads, and weaving is one of the primal and most univer­sal employments of mankind. Either remains of implements employed in spinning, or spun threads, are found wherever traces of prehistoric man make their appearance. The simple spinning apparatus which was used in the earliest ages continued to be used by civilized communities till comparatively recent times, and it may therefore be said that no art which has been so long and widely practised remained so unprogressive as that of spinning. On the other hand, since about the middle of the 18th century, when human ingenuity bent itself in earnest to improve the art, there have not been developed in the whole range of mechanical industries machines of greater variety, delicacy of action, and manifold productive capacity than those now in use for spinning.

The primitive thread-making implement consisted of a wooden spindle, from 9 to 15 in. long, which was rounded and tapered at both extremities, as in the accompanying figure. Near the top there was usually a notch in which the yarn was caught while undergoing the operation of twisting, and lower down a whorl, or wharve, composed of a perforated disk of clay, stone, wood, or other material was secured to give momentum and steadiness to a rotating spindle. Long fibres were commonly attached to a distaff of wood, which was held under the left arm of the operator, but short fibres were spun from carded rolls. After attaching some twisted fibres to the spindle, a rotatory motion was given to the latter either by rolling it by hand against one thigh, or by twirling it between the fingers and thumb of the right hand, after which the fibres were drawn out in a uniform strand by both hands and converted into yarn. When the thread was of sufficient strength, the spindle was suspended by it until a full stretch had been drawn and twisted, after which that portion was wound upon the body of the spindle, and the operation continued until the spindle was filled. The quantity thus rolled up gives the name to a now definite measure of linen yarn, namely “ the spindle, ,, or 14,400 yards. Simple as was this primitive apparatus, a dexterous spinner could produce yarn of an evenness, strength and delicacy such as has scarcely been exceeded by elaborate modern appliances. The yarns for the gossamer-like Dacca muslins of India were so fine that 1 lb weight of cotton was spun into a thread nearly 253 m. long. This was accomplished with the aid of a bamboo spindle not much bigger than a darning needle, and which was lightly weighted with a pellet of clay. Since such a tender thread could not support even the weight of so slight a spindle, the apparatus was rotated upon a piece of hollow shell. The spindle as here described was, so far as is

@@@1 See A. J. Hipkins, *The History of the Pianoforte,* pp. 71-73 (London, 1896).