Geologist and award winning philatelist, Josef Charrach, digs deep to present another gem of a thematic article on precious stones. This instalment tells the story of the most desired gemstone of all—the diamond. From the depth of the earth to the crowning piece in the Crown Jewels, Josef traces the fascinating history, industry and usage of the diamond, as told through stamps.

The Story of the Diamond

By Josef Charrach

Diamond—the undisputed king of all gems and the symbol of steadfast love—is composed of pure carbon and is the hardest substance known to man (*Fig 1*). It derives its name from the Greek word *adamas*—unconquerable. Its value as a gemstone is determined by four factors: the carat weight, (carat is equivalent to the uniform weight of a carob seed), cut, clarity and colour.

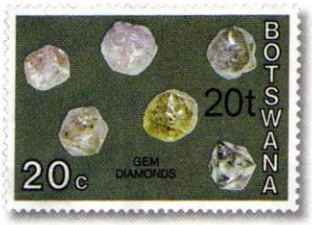


Fig 1 Rough diamonds

No one knows when men began collecting diamonds, but it may have been as early as 800BC around Golconda in India. The Indians systematically organised alluvial diggings that lasted until the early 1700s. Diamond-tipped tools and diamond-edged knives were in common use in India during this long period and were exported to China as jade-cutting knives. Indian rulers placed a high value to these stones, attributing luck, love and power to the biggest, some weighing 200 carats or more. Among the historical diamonds known from India are the Hope, Orloff, Kohinoor, Great Mogul and Shah.

As the Indian mines became depleted in the 18th century, rich new fields were being discovered in Brazil, producing many high-quality stones. These areas were overshadowed by the major finds in South Africa that began in 1866. The first diamond discovered, about 13mm in diameter and weighing 21 carats, was later named the Eureka. It was accidentally sighted among pebbles used by children playing the old game of 'five stones' on a farm near Hopetown beside the Orange River.

The stone was ignored until the next diamond was found and then was immediately recognised. This second stone was 83 carats and measured just over 20mm across. It became known as 'The Star of Africa'. This diamond set off a rush that altered the development of Southern Africa to the extent whereby the British Central Africa Protectorate later incorporated the pick, shovel and local mining force into their coat of arms (*Fig 2*).

In 1868, diamonds were found on three farms located near the Vaal River. The richest finds being made on a farm owned by the De Beer brothers. This find brought a major influx of over 2000 miners, working 1500 claims, each claim being just under 10 metres

Fig 2 Coat of Arms of British Central Africa

Fig 3 Kimberlite volcano—Kimberlite misspelled

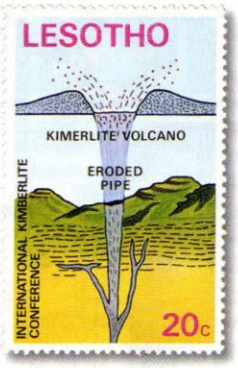
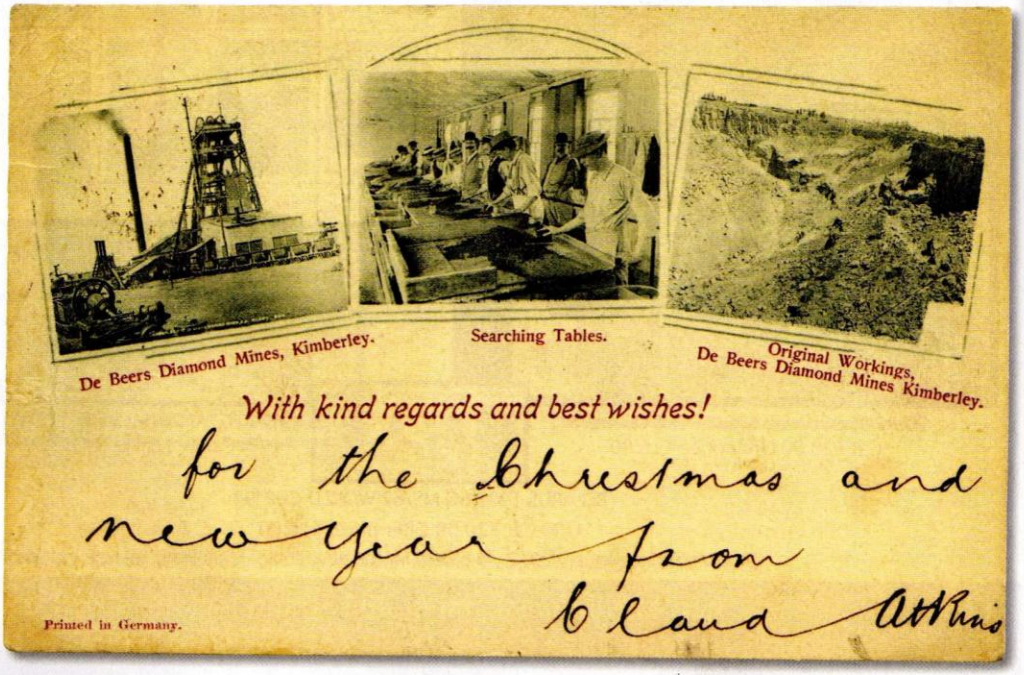


Fig 4 Kimberlite rock

Fig 5 Diamond



No one knows when men began collecting diamonds

square. The dry diggings were not in river gravel as before, but were in the weathered tops of diamond bearing kimberlite pipes.

The rock was named after the town that was named in honour of the Earl of Kimberley, the British colonial secretary. Kimberley was established in 1873 to encompass all the surrounding mining camps.

Kimberlite pipes are volcanoes emanating from deep in the mantle of the earth (*Fig 3*), and are composed of iron magnesium silicate minerals (*Fig 4*). At such depths elemental carbon is subjected to very high temperatures and pressures, changing the crystal structure into the hardest known material. The silicate minerals easily decompose with water forming a soft rock near the surface from which diamonds can be easily liberated (*Fig 5*).

Big business

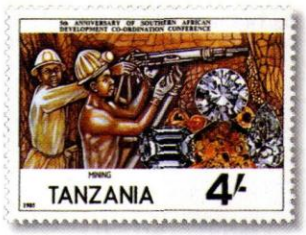
Mining of the kimberlite pipe, known as 'The Big Hole' (*Figs 6* and *7*), had reached a depth of 15 metres by 1882 and in 1884 the first major landslide occurred with the influx of floodwater. This triggered the start of mergers and buyouts. Two Englishmen, Barney Barnato, a diamond buyer, and Cecil Rhodes, a diamond miner, who brought the first pump to the mines, emerged as the entrepreneurs of the day. In March 1888, De Beers Consolidated Mines was formed, with Rhodes buying out Barnato, and by 1890 it owned all the diamond mines. At this time surface mining became very dangerous and underground mining started in 1892 (*Fig 8*). In 1908 Zacharias Lewala, a railway track worker discovered the first diamond in German South-West Africa, now Namibia.

Namibia's (SWA) diamonds are found in beach sands along the shoreline, north of the mouth of the Orange River (*Fig 9*). The diamonds originate from inland kimberlite pipes, which weathered away. The hard diamonds were eroded away and travelled down to the mouth of river, to be redeposited along the beaches. Only the most perfect diamonds survived, providing for a high percentage of gem quality (*Fig 10*). Mining is carried out by bucket shovels, or by dredging (*Figs 11* and *12*).

The dynamic German, Sir Ernest Oppenheimer (22 May 1880–25 November 1957) (*Fig 13*) formed the Anglo American Corporation, which invested in the mining of gold and metals. It entered the diamond industry by purchasing rights in the alluvial deposits of South West Africa and through Consolidated Diamond Mines Oppenheimer gained a place on the board of De Beers and became chairman in 1929. By contracting with governments and mines to buy the entire yearly production, he ended the price fluctuations that had plagued the industry. De Beers now markets 85 per cent of the world's production.

Fig 6 (left) From the mine to the searching tables—Cape of Good Hope, Postal Stationery
Fig 7 (below) Cancellation from the Kimberly mine known as 'The Big Hole'

Fig 8 (right) Underground mining for diamonds
Fig 9 (far right) Searching for diamonds in the beach sands



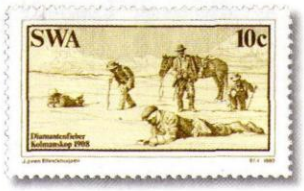


Fig 10 (right) Rough diamonds
Fig 11 (far right) Mining the beach sands of the Orange river

Fig 12 (below, right) Placer mining of the beach sands
Fig 13 (below, far right) Sir Ernest Oppenheimer

Diamonds in the rough

After mining, the rocks are crushed to a maximum size of 32mm. As diamond has a specific gravity of 3.5, the main separation is by washing and cycloning in heavy fluids. The dense material of the coarse fraction is then cascaded through an X-Ray beam, which causes the diamonds to fluoresce, and a photoelectric detector directs an air jet to blow the diamonds into a collector box. The gem diamonds are sent, with most of Africa's output, to the Oppenheimer House in Kimberley, for sorting and valuation. This is done by hand under indirect sunlight. All sales of rough stones are made in London through De Beer's Central Selling Organization, before they go for cutting in Belgium, Israel, India and the USA. The main sources of diamonds come from Australia, Zaire, Botswana, the former USSR, South Africa, Angola and Namibia.

Industrial diamonds make up to 80 per cent of all diamonds produced

Diamonds are classified as gem or industrial grade. Industrial diamonds are those that are too flawed, irregularly shaped, poorly coloured, or too small to be of value as a gem. These make up to 80 per cent of all diamonds produced. Three varieties exist: ballas, bort, and carbonado. Additional supplies are manufactured from graphite (pure carbon), which is subjected to very high temperatures and pressures. Industrial diamonds are extremely important in the modern metal working industry; for the manufacture of grinding wheels, inset in diamond-cutting drill bits and as an abrasive in polishing. High-tech industries use the excellent thermal conductivity properties of diamonds to detect very small changes in temperature. Another important property is that diamonds are highly sensitive to radiation. A diamond dosimeter inserted directly into a human tumour can monitor the amount of radiation being delivered during therapy.

Diamonds in nature vary from colourless to black; and may be transparent, translucent or opaque. Most diamonds used as gems are transparent and colourless or nearly so. Colourless or pale-blue stones are most valued, but these are rare. Most gem diamonds are tinged with yellow. A 'fancy' diamond has a distinct body colour: red, blue and green are rarest, and orange, violet, yellow and yellowish greens are more common. Most industrial diamonds are grey or brown and are translucent or opaque. A very high refractive power gives the diamond its extraordinary brilliance. A properly cut diamond will return a large amount of light to the eye of the observer and will appear brilliant. The high rate of dispersion gives diamonds their fire, which is caused by the separation of white light into the colours of the spectrum as it passes through the stone.

Sorting, cleaving and cutting

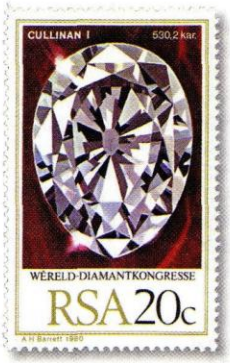
Gem diamonds are initially sorted into several categories—according to size, colour, clarity, and shape. Sorters use simple tools: sieves, a ten-power magnifying glass and, most of all, knowledge and experience. The next task is for the marker to examine the structure of the rough stone and decide in which direction it should be cleaved or sawn. Each diamond is unique. The aim is to achieve a polished diamond of maximum cleanliness with minimal weight loss. Once the diamond

Fig 14 Diamond polishing

Fig 15 Brilliant cut diamond

Fig 16 Marketing of diamonds at the Tel Aviv bourse

Fig 17 Premier diamond mine postmark



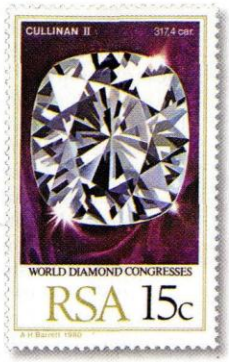


Fig 18 (far left) The Cullinan I diamond
Fig 19 (left) The Cullinan II diamond

Fig 20 (far left) Sovereign's Sceptre
Fig 21 (left) Imperial State Crown

Fig 22 The British Crown Jewels

has been marked it is then cleaved. Cleaving splits a diamond into two or smaller stones and removes irregularities or impurities. The diamond is set in a wooden dop (holder); a groove is cut into it with another sharp diamond. The cleaver places a steel wedge with a rounded edge in the groove and by a sharp blow with a mallet, splits the stone parallel to the grain of the crystal. Diamonds can be divided against the grain by sawing in order to exploit the stone.

Once has been cleaved the last stage in producing a gem is to facet the stone. Faceting is carried out on a horizontal cast-iron wheel coated with oil and diamond dust. The diamond, mounted on a dop at the end of a mechanical arm called a tang, is placed against the wheel and each facet is ground at a specific angle (*Fig 14*).

The brilliant-cut diamond has 58 facets: a table, 33 crown facets and 25 pavilion facets. The many ways of polishing diamonds include standard cuts, such as brilliant (*Fig 15*), marquis, baguette, pear, and fancy cuts such as heart shapes. Each cut has standard proportions and angles, which ensure perfect reflection of light for maximum brilliance and lustre.

The largest gem diamond ever discovered weighed 3106 carats

Cut diamonds are sold at diamond exchanges (*Fig 16*), which are meeting places for buyers and sellers in a relaxed atmosphere with maximum security. A handshake and the Hebrew words *'Mazal and Bracha'*, which means good luck and a blessing, close the deal.

Diamonds are used in ornaments and jewellery, royal crowns and sceptres. The jeweller designs the setting for the diamond that has completed the journey from the mine through manufacture to the finished jewel.

The largest gem diamond ever discovered was found in the Premier Mine, Transvaal (*Fig 17*) on 26 January 1905. The stone weighed 3106 carats (0.62kg), and measured 101mm long, 63.5mm high and 50.5mm wide. It was notable for its blue white colour and exceptional purity. It was named the Cullinan diamond after Thomas Cullinan, the owner of the Premier Mine.

The Cullinan diamond was presented to King Edward VII by the Transvaal government in honour of his 66th birthday. The diamond was cut into nine large stones and 96 smaller ones by the Amsterdam Company of I J Asscher. The two largest stones are the Cullinan I and II (*Figs 18* and *19*). The Cullinan I was set in the British Royal State Sceptre (*Fig 20*), while the Cullinan II is set in the British Imperial Crown (*Fig 21*). Perhaps one of the greatest collections of jewels and diamonds belongs to the British Royal Family and is housed in the Tower of London (*Fig 22*).