NEW MINE SAPPHIRES

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A ROYAL GEM

North America, showing the position of the "New Mine."

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A ROYAL GEM

A MONOGRAPH ON THE SAPPHIRE, WITH A BRIEF HISTORY AND DESCRIPTION OF THE "NEW MINE"

ISSUED BY
THE NEW MINE SAPPHIRE SYNDICATE
LONDON
1914

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THE SAPPHIRE

THIS beautiful word sapphire is a synonym for blue; to use it with an adjective qualifying colour is an etymological crime. Sapphire! the very sound conjures up visions of tropical seas, of deep, placid lakes, of the azure dome of a cloudless sky, and of the modest gentian clustered many-headed in a sunny pocket on the mountain side. No sapphire exists which is not blue; there are few shades of blue which the sapphire cannot match.

¶ The terms yellow sapphire, white sapphire, and the like, should give way to correct nomenclature. Let the gems they now represent be known as corundum in the interests of lingual purity, and for the better appreciation of the chromatically perfect range of hues encompassed in the sapphire.

¶ From the deep blue of a moonless night—almost black, but for a mysterious gleam of indigo—through the finest of gradations in colour, to the perfection colour of the cornflower, thence to the most delicate of steely blues, the sapphire—more particularly the "New Mine" sapphire—delights the eye of

the lover of beauty. Truly, it is a Royal Gem.

¶ To the artist the sapphire is the equal in effect and value of her twin sister the ruby, and by a robustness of disposition and prolificness of supply is far in advance of other gems for commercial utility.

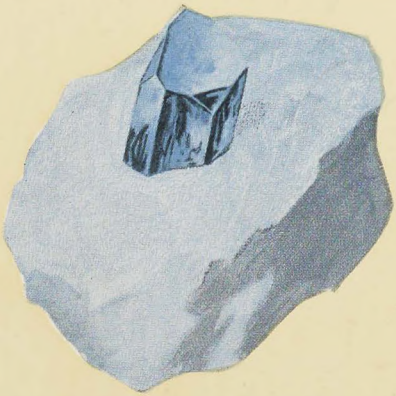
¶ The jeweller will probably find the sapphire represented in his stock in far greater numbers than all gems, except the diamond. This is because the public favour the sapphire, and because the steady supply during the last decade of evenly coloured and well matched sapphires from the "New Mine," has provided the industry with a very effective and dependable "line."

¶ The sapphire is unsurpassed as an associate to the bold brilliance of the diamond. It presents a strong colour-contrast without harshness ; by co-operation it magnifies the blue and violet rays, and by negative action modifies and almost overcomes any traces of yellowness the diamond may possess. These useful properties are possessed by sapphires to a far greater extent than by other coloured gems. The ruby will emphasise the impure colour of a brownish diamond ; an emerald will magnify a yellow tinge in a by-water stone ; but it is always safe to use a sapphire.

¶ Although it is not intended that this monograph shall usurp the functions of the text book, some few details of the scientific facts connected with the gem are mentioned in order that the reader may have all the required information before him without further reference.

¶ As a mineral the sapphire belongs to the corundum group, which is a crystallised sesquioxide of aluminium. This group also embraces the ruby—both the Burmese and Siamese—the colourless corundum, the pale pink, pale yellow, grey, green and other shaded gems—miscalled "fancy" sapphires —the oriental topaz (yellowish orange corundum), the oriental emerald (dark green corundum), the oriental amethyst (purple corundum), the asteria, or star-stones, and common corundum. This last variety, when granulated and mixed with magnetite and other hard foreign substances is called emery ; it is used as an abrasive.

¶ The sapphire owes much of its popularity as a gem to its ability to withstand wear. In hardness it ranks next to the diamond, although it is said that the difference in the degrees of hardness between the diamond and the sapphire is greater than the total

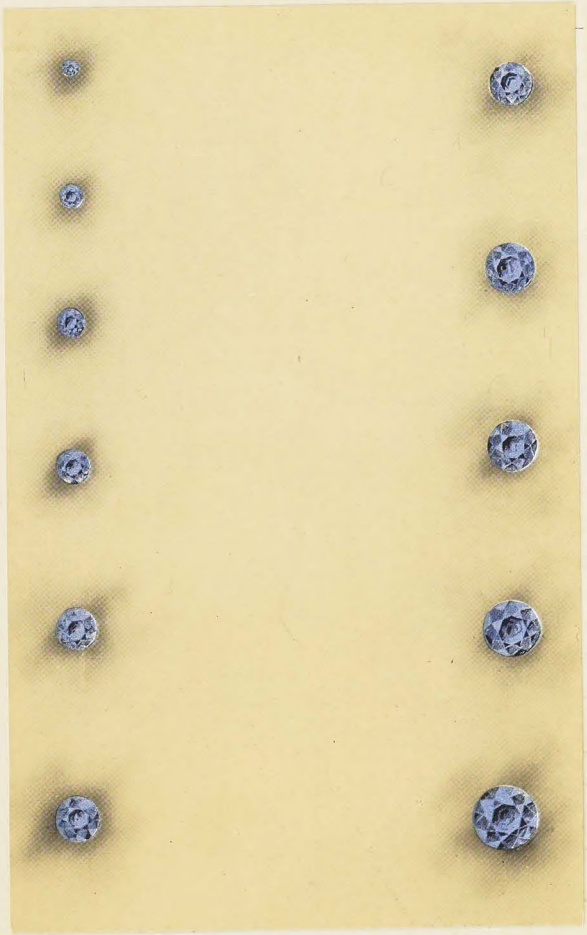


Sapphire Crystal in Matrix.

difference of degree between the sapphire, known as number 9 in the mineralogist's scale, and talc, number 1 in the same scale, which can be scratched with the finger nail.

¶ Sapphires crystallise on the rhombohedral system; generally a double six-sided pyramid, occasionally as a hexagonal prism. Owing to the relative purity of the chemical composition, writes Dr. G. F. H. Smith in "Gem Stones," the refractive indices are very constant; the ordinary index ranges from 1·766 to 1·774, and the extraordinary index from 1·757 to 1·765, the double refraction remaining always the same, 0·009.

¶ Until comparatively recent years the world's supply of sapphires came from the East. India, Ceylon, Siam and Burma produced these gems in various quantities and markedly different in colour. The Kashmir mine, situated in the Zanskar range of the north-western Himalayas, had the credit of producing gems more nearly approaching "perfection colour" than other mines. The occurrence of sapphires in the ruby mines of Burma is comparatively rare. Ceylon sapphires are distinguished by a most disturbing patchiness of colour. Indeed, the colour is so severely localised in many crystals that



The "New Mine" Sapphire.

none but the most expert lapidaries are able to "make" gems of any size with success. A great quantity of good sapphires come from Siam, and the mines in Anakie, Queensland, produce a grade of very dark, greenish sapphire which is not sufficiently attractive in colour to achieve popularity as a gem.

¶ One of the richest sapphire bearing districts in the world to-day is situated in the United States, in Fergus County, Montana. The property, known as the "New Mine," is owned by the New Mine Sapphire Syndicate, a company registered in the State of Montana, but controlled by English financiers with head-quarters in London.

¶ The gems produced at the "New Mine" are sapphires of a rare distinction and quality. They have an evenness of colour, an almost complete absence of "silk" and milkiness, are favoured with a freedom from blemishes and impurities, and match up in a very practical and useful manner.

¶ In colour the "New Mine" sapphires run the gamut from a deep magenta, through the valuable colours of cornflower blue and royal blue, to a very brilliant and pleasing pale blue shade, like a glint of steel.

¶ One most remarkable attribute, and a

Sapphire

Group	Corundum
Chemical Division	Sesquioxide of Aluminium
Chemical Composition	Al_2O_3
Crystalline System	Rhombohedral or hexagonal
Crystalline Form	Hexagonal prisms and double pyramids with hexagonal bases
Occurrence	In highly crystalline rocks, such as granite, syenites gneiss, mica schist and granular limestone
Cleavage	Distinct; parallel to the faces of the rhombohedron
Specific Gravity	3·9 to 4·03
Hardness	9
Refraction	Double
Dichroism	Strong in some specimens
Refractive Index	1·761 to 1·770
Opacity	Translucent, occasionally chatoyant
Lustre	Vitreous
Colours	Oriental sapphires occur in all colours. "New Mine" sapphires all shades of blue and magenta

feature adding a great artistic and commercial value to the gems, is their radiance when viewed by artificial light. Oriental sapphires, excepting only the very finest and most expensive, have the one great failing of absorbing artificial light and of appearing black and lustreless under these circumstances. The "New Mine" sapphires reflect artificial light as well as daylight, and, as a consequence, when worn at night with the lights coming from many directions the "New Mine" sapphire gains in life and beauty, giving ray for ray and glow for glow in a merry duel of brilliancy with every flashing light.

¶ They have a very enviable reputation among manufacturers of jewellery for giving satisfactory results, both in a high grade jewel where picked specimen gems only would be employed and in the more regular and marketable lines where elegance must be combined with economy.

¶ The great nicety and rapidity with which well-matched ranges of stones can be picked from comparatively small parcels are valuable features. These, also, ensure that rejections are unknown, the parcels being used to the last stone. Oriental stones are uneconomical

to handle in this respect; manufacturers well know the difficulty of matching and the great time spent on this work. The retail jeweller will appreciate these facts, since they have a great bearing upon the value he is able to offer the public and, consequently, a direct bearing also upon his sales. Added to this is the all-important fact that the "New Mine" sapphires are placed on the market at prices ranging from 20 to 10 per cent. *below* the cost of oriental stones.

¶ The prices are not fixed so low because the stones are any the less attractive or worth less than other gems of equal quality, but because the situation of the mine, its rich output at a low working cost, and its ownership by a private company without the capitalisation and heavy charges of a public corporation, enable the business to be profitably conducted on a low scale of selling prices. "New Mine" sapphires have been known also as Montana sapphires and as Yogo sapphires. The location of the mine in the Yogo Valley, in Montana, is sufficient explanation of this.

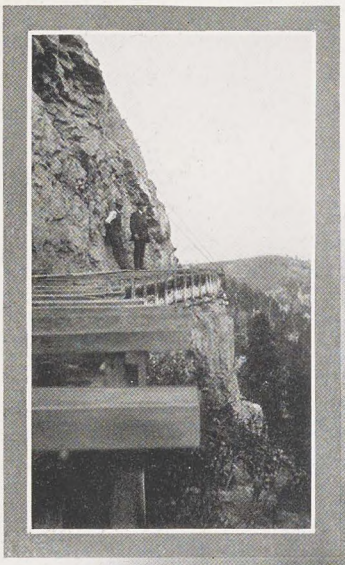
¶ The gems can be purchased by manufacturers through stone dealers, and jewellery set with "New Mine" sapphires can be purchased by retail goldsmiths from manufacturers and wholesale houses.

THE NEW MINE

THE Yogo Valley lies amid a spur of the Rocky Mountains, 5,000 feet above the sea. In the neighbourhood of the mine the scenery is wild, almost desolate; the nearest town of any size is Great Falls, 92 miles away, and the nearest railroad depot is 26 miles in a north-westerly direction.

¶ A "gold-rush" peopled the upper portions of the valley in 1879 and four adventurous spirits decided a few years later to prospect the lower water courses and *coulees*, on the assumption that the gold would have been carried from above. This was in 1894. A few months prospecting proved the deposits too poor to work at a profit; for an expenditure of many thousands of pounds, represented largely by the necessity of building an artificial flume and ditch to convey a stream of water for washing operations from the Yogo Creek ten miles away, the partners gained gold dust worth about £150 only.

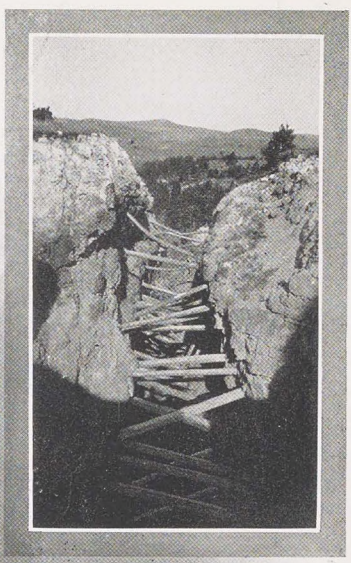
¶ Their possessions also included a cigar box full of blue crystals, collected from the clean-ups, which were recognised as sapphires by a New York expert. By this discovery the



Flume on face of cliff.

attention of the miners was turned from gold to gems. Placer gold is found on the property of the "New Mine," but in such small traces as to make it a negligible quantity. In the modern workings the presence of the gold is ignored; it does not pay for extraction.

¶ Mr. F. H. Lathbury, A.I.M.M., an eminent mining engineer, visited the mine recently and in his report stated that "the ore deposit fills a nearly vertical fissure in a horizontal series of limestone rocks. The filling is composed of basic intrusive dyke, together with quartz veins and segregations of calcite and iron pyrites. . . . The sapphires are found in the dyke rock." The dyke rock is similar in substance to the "blue ground" or diamond-bearing



Open working, now abandoned.

clay of South Africa. The occurrence of the sapphires shows quite conclusively that they were formed in the dyke rock itself, and their origin is believed to be the result of the action of molten igneous rock upon fragments of clay shale, or impure limestone, taken up by the former in its ascent. The average width of the dyke is eight feet between the walls and extends a considerable distance in depth; the limestone formation in the neighbourhood is known to be a thousand feet thick and to rest upon nearly a thousand feet of Cambrian shale.

¶ The mining property of the Syndicate has an area of, roughly, 1,250 acres, covering the sapphire lode for a length of $3\frac{1}{2}$ miles. Pagel Ranch, with an area of 560 acres, is also the

At work in the New Mine.

property of the Syndicate; this furnishes food supplies for the miners, and grows saleable crops by the use of by-products and tailings from the mine as fertilisers.

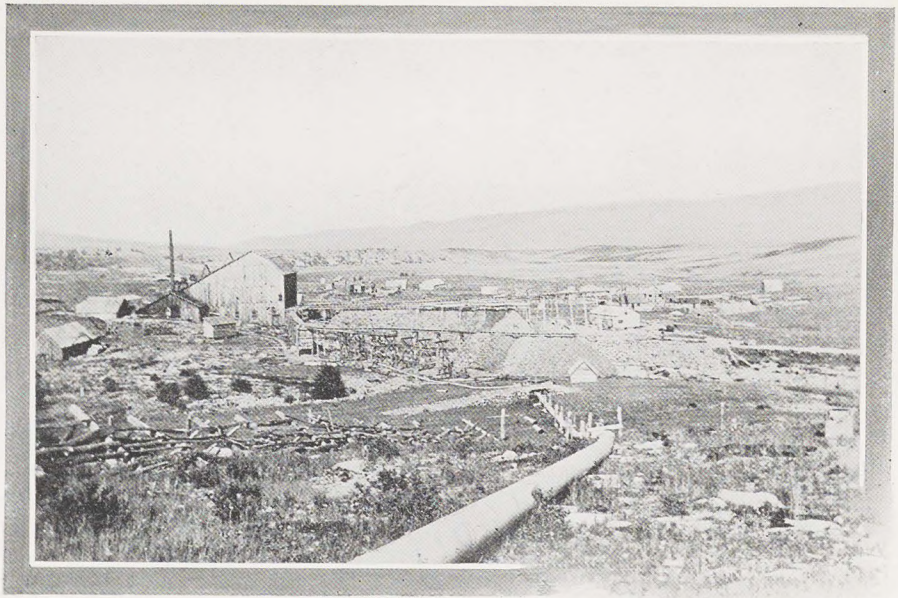
¶ Until the mine became entirely vested in the present management the dyke rock was extracted in the first instance from surface cuts. The pay dirt was hoisted in a primitive manner in bucketfuls by hand windlasses, or was reduced by hydraulicing. As practically no timbering was done, thirty feet was the utmost depth to which the cuts could be worked in safety. Tunnels were next cut in and the ore extracted on much the same plan as that adopted at the Cornish tin mines by the Phœnicians. In 1903 a shaft was sunk

The Dump.

on the Blue Diamond Claim and machinery installed. Mining operations have since been carried on in the orthodox manner.

¶ The principal workings at present are at the 250 ft. level, from which two drifts have been driven east and west. The ore is broken by drilling with a low power nitro explosive. For the harder rock hand boring tools are used. The ore is raised from the mine by the Blue Diamond shaft in trucks with a capacity of eighteen cubic feet each.

¶ When freshly brought to the surface the ore has the appearance of a hard and fairly compact rock, with a slightly blue colour tinged with green ; this latter shade being due to the presence of yellow pyrites in



The New Mine

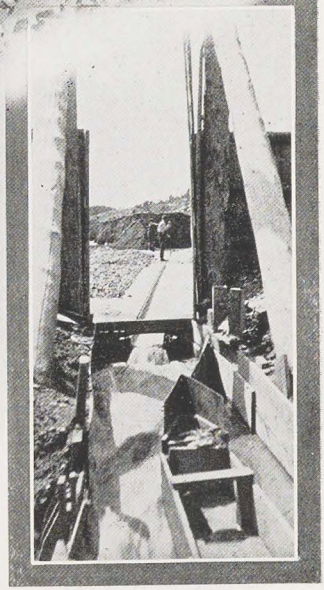
minute particles. The sapphire crystals are distributed throughout the ore with no great profusion ; weathering and washing operations on a large scale are required for their extraction.

¶ Owing to the severe winters experienced at the altitude of the mine, washing operations are possible during the summer months only. Underground work is pursued throughout the winter, the ore being raised and accumulated on a huge dump heap at the pit-head. The trucks containing the ore are raised direct from the shaft to a platform and wheeled out along rails laid over tall trestles. Originally the dirt was dumped on the bare ground ; it is now laid on a wooden "floor." All the washing operations are carried out on "floors," the total area of wood being over 100,000 square feet.

¶ The ore remains on this floor for some time in order that it may break up by natural weathering. Frequent sprinklings of water and steam from the hoisting engine are directed on the dump to hasten the disintegration of the harder rocks and to assist in the slackening process. With the approach of spring and the washing season, streams of water, conveyed from the Yogo creek

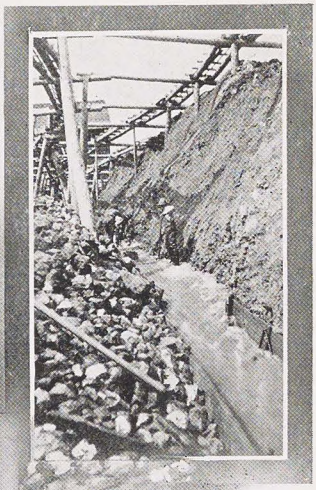
View of Washing Floors.

by the flume, are led against the side of the slacked ore dump, and the ore is washed into the sluices. The larger rocks are returned to the floor for further weathering, whilst the pay gravel is passed over a series of *riffles* or gratings in which the sapphires, and other minerals having a high specific gravity, concentrate.



Near View of Dam.

¶The coarser tailings from the first sluice are discharged into a dam, to be again stacked into a dump and given a further season's weathering. Ultimately this dam is sluiced out over riffles, and the



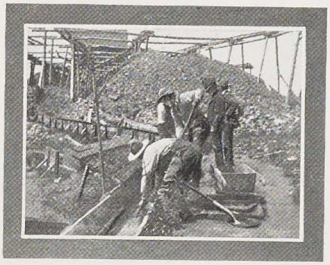
Sluicing.

Examining the Dump.

larger pieces of ore which still resist decomposition are again collected in dam No. 2. Here it is given another season's exposure to the weather and is sluiced over another series of riffles to a third dam. From time

Dam No. 1 after Clearing.

to time the third dam is sluiced out and the tailings are allowed to run to waste. These operations occupy four seasons ; from the time a certain truck load of ore is deposited on the dump, until it is finally disintegrated and has the last sapphire extracted, a period of nearly four years must elapse.



Clearing a Sluice.

¶ Sluicing is suspended four or five times every twenty-four hours ; the riffles are lifted and the concentrate cleared and washed in a hand

Clearing Riffles.

rocker. The rocker is a series of shallow sieves with the screens graduated from large to small. The larger sized siftings are hand sorted on the mine, and the gem crystals sent to London for grading and cutting. The finer concentrate is passed through a separating machine. This machine has a soft iron roller charged with static electricity ; as the gravel and gems pass over this, the gravel is thrown off whilst the sapphires drop into a collecting trough.

The Hand-rocker.

Panning the Concentrates.

Group of Miners.

Oxen on Pagel Ranch.

All the rough gems pass through the London office before being cut and sold.

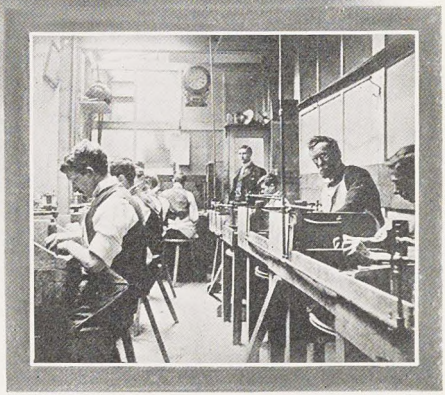
¶ The lion's share of the mine's product returns to the United States as polished gems, where they are extremely fashionable and in great demand. But the jewellers of Great Britain are now becoming aware of the singular beauty and the valuable selling points of the "New Mine" sapphire, and are buying large quantities of the gem. The trade with continental jewellers is also a rapidly increasing one.

¶ The smaller crystals, which from colour or size are unsuitable for use as gems, find many scientific and industrial uses. They are manufactured into jewel-holes and bearings for watches, clocks, delicate machinery, and scientific instruments. Also for use upon gramophone recording and reproducing sound boxes and other mechanical appliances where a fine unwearable point is required.

¶ Up to the present date the demand for "New Mine" sapphires has always been in excess of the supply. As the gem becomes known in the centres of taste and fashion it wins new friends and admirers. From time to time considerable developments have taken place at the mine, and further improvements

and extensions of equipment now in progress will enable a larger supply of gems to be placed on the market. The development of the mine can be understood from the fact that the amount of ore extracted during the year 1903 amounted to only 5,000 tons; 18,000 tons were mined in 1912.

Lapidary at Work.



Lapidary's Workshop.

CUTTING AND POLISHING SAPPHIRES

AFTER being graded for size and colour by experts at the London office of the Syndicate, the sapphires are sent to cutters in London or the Jura Mountains, according to the style of work required or other special circumstances.

¶ The cutter is handicapped in his treatment of oriental sapphires consequent upon the uneven distribution of colour in the crystals. Each oriental stone must receive individual treatment, the size and shape being more or less restricted by the disposition of the colour. For instance, many Ceylon sapphires have a colour band in one portion of the crystal, the remainder being colourless. The lapidary will shape the stone to bring the colour at the base ; this treatment gives the finished stone a blue appearance from the front, but when viewed from any other angle the stone is almost colourless. To obtain the best effect with oriental stones they must occasionally be odd-shaped and "lumpy" below the girdle.

¶ These defects and difficulties do not exist in the gems from the "New Mine." The

Styles of Cutting and Fancy Shapes.

evenness of colour and freedom from silk and cloudiness permit of cutting and polishing in any style with the greatest ease, without undue waste of the valuable material, but yet without retaining more than an average amount of weight. "New Mine" sapphires are never patchy or uneven in colour, nor are they lumpy or thick in shape. They may be cut to any required style or size without loss of effect or richness of colour.

¶ Modern styles of polishing and cutting coloured stones are :

¶ Brilliant.—A series of triangular facets arranged round an eight-sided table on the upper part of the gem, and a corresponding series of triangular facets between the girdle and the point on the lower part.

¶ Trap or Step.—A series of horizontal facets cut parallel to the girdle and the table on the upper part of the gem, and parallel to the girdle below.

¶ En Cabochon.—A smoothly domed upper part with the back either flat, concave, or convex.

¶ Calibré.—A modern variation of trap-cutting. The stones are cut to a certain size and shape to fit special positions in a manufactured jewel.

¶ The brilliant and trap styles of cutting are sometimes applied to the same gem, the one above and the other below the girdle. En Cabochon is usually applied to asteria or star stones ; the back is either flat, concave or convex according to the depth of colour required. For calibré cutting the usual order of manufacturing is reversed ; instead of the mount being made for the gem, the gem is cut for the mount.

¶ Cutting is the process of shaping up the gem and grinding facets on the surfaces. Polishing is the final operation of removing the roughness left by the faceting and imparting the fine surface seen upon a finished gem.

¶ The lapidary selects a crystal and after a critical examination decides how and where it shall be divided for cutting. Very rarely is a crystal of any size cut without a preliminary slitting into two or more pieces. The cleavage of the sapphire is very distinct, but the practice of slitting the gems on the edge of a small rapidly rotating metal disc, fed with diamond dust and oil, is a surer method of division. After slitting, the portion of the sapphire to be cut is cemented to a wooden holder ; the stone is now applied to the

surface of a revolving lap of soft metal charged with diamond dust, each portion being presented to the action of the lap in turn until the necessary facets are applied.

¶ The holder is held in the lapidary's hand with its upper end steadied against a small vertical post having a series of notches or holes at varying heights, corresponding with the angles at which the holder is usually placed. Mechanical aids for the correct formation of facets are in use, but the more skilful lapidaries use their own judgment and depend on this for the correct shaping and angles of the facets. After the upper part, or crown, of the gem is cut, it is unset and turned over in the cement. The base or pavilion facets are applied in a similar way.

¶ To polish a sapphire the lapidary uses a similar holder, but a wooden lap covered with leather and a softer abrasive. The gem is cemented to the holder and each facet is carefully held to the face of the lap until it loses all marks and abrasions of the cutting process and acquires a high polish. The gems are then cleaned, sorted into parcels of a convenient size and character, and are ready for the market.

A COMMERCIAL NOTE

RETAIL jewellers are requested to specify the "New Mine" sapphire upon their orders for gem jewellery, and to insist upon receiving the brilliant, evenly coloured "New Mine" sapphire from manufacturers and wholesale houses.

¶ The New Mine Sapphire Syndicate confine original supplies to accredited stone dealers only. Manufacturers can obtain adequate and well-assorted parcels at the market rates through these channels without difficulty.

ILLUSTRATIONS

of

FINE JEWELS

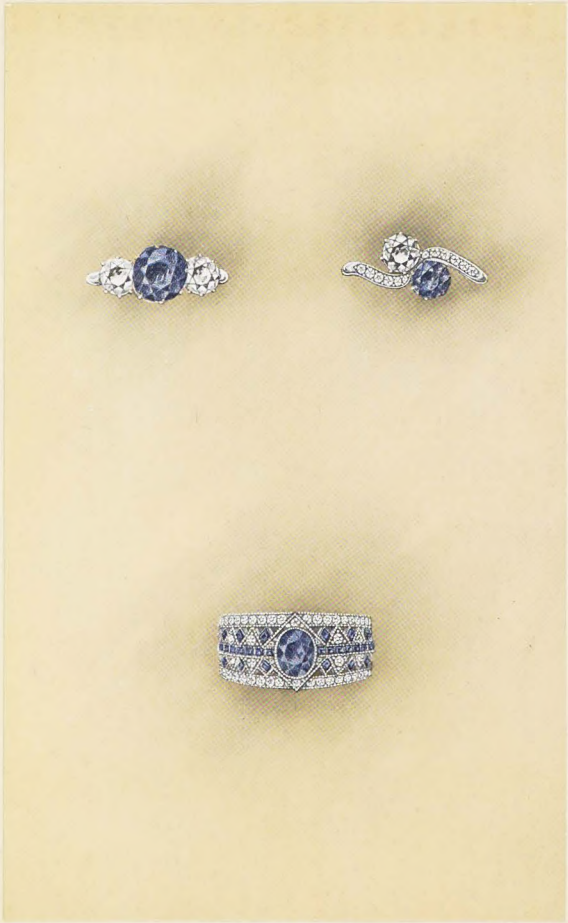
set with

NEW MINE

SAPPHIRES

Three gracefully designed brooches in platinum, set with diamonds and "New Mine" sapphires.

Three exquisite examples of ring mounting in platinum, set with diamonds and "New Mine" sapphires.



Three artistic pendants in platinum, set with diamonds and "New Mine" sapphires.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MINISTÈRE DU COMMERCE DE L'INDUSTRIE DES POSTES ET DES TÉLÉGRAPHES
EXPOSITION UNIVERSELLE DE 1900
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DÉCERNE UN DIPLÔME DE
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NEW MINE SAPPHIRE SYNDICATE
UNCUT SAPPHIRES

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