Zeitschrift: The Swiss observer : the journal of the Federation of Swiss Societies in the UK

Herausgeber: Federation of Swiss Societies in the United Kingdom

Band: - (1966)

Heft: 1507

Artikel: Synthetic precious stones and swiss machinery for the manufacture of jewellery

Autor: Meylan, R.

DOI: https://doi.org/10.5169/seals-696159

The Swiss Observer

FOUNDED IN 1919 BY PAUL F. BOEHRINGER.

The Official Organ of the Swiss Colony in Great Britain

Advisory Council: R. J. KELLER (Chairman), GOTTFRIED KELLER (Vice-Chairman), O. F. BOEHRINGER, J. EUSEBIO, A. KUNZ, G. E. SUTER

EDITED BY MRS. MARIANN MEIER WITH THE CO-OPERATION OF MEMBERS OF THE SWISS COLONY IN GREAT BRITAIN

Telephone: CLERKENWELL 2321/2. Published Twice Monthly at 23, LEONARD STREET, E.C.2. Telegrams: FREPRINCO, LONDON.

Vol. 52 No. 1507 FRIDAY, 26th AUGUST 1966

SYNTHETIC PRECIOUS STONES AND SWISS MACHINERY FOR THE MANUFACTURE OF JEWELLERY

By R. MEYLAN, Lausanne

Everyone is familiar with synthetic jewels from having seen them in the form of red bearings in a watch, or as decorative gems, often facetted and in all colours, mounted on rings, brooches, bracelets, etc. A few decades ago, natural gems (rubies, sapphires and garnets) were still used as raw materials for the manufacture of so-called industrial jewels.

According to Verneuil himself, the inventor of the synthetic gem, " from the chemical, physical and crystallographic points of view, the properties and molecular structures of fusion-produced rubies and natural rubies are identical ". It was therefore quite natural for the synthetic product to replace the natural gem, thus ensuring industry a steady source of supply, stable prices and above all constant and high quality.

Swiss production of rough synthetic stones rapidly leapt to the front of the field and today supplies products of unequalled purity used by industries all over the world for techniques as revolutionary, for example, as the use of solar energy and the manufacture of lasers.

In Switzerland, synthetic rubies were first used in 1904 for the manufacture of watch bearings or " watch stones " as they are commonly called. The layman is always surprised to learn that so small an object requires such a large number of machining operations, the most important of which we shall indicate briefly below:

Sawing the uncut stones into slivers, obtaining the thickness of the slivers, sawing the slivers into squares, obtaining the thickness of the discs, rough shaping the hole, obtaining the right diameter of the hole, turning and polishing the outer diameter and the flat surfaces, following out the oil-hole, smoothing the angles of the edges, finishing the hole.

A glance at the above list of operations suffices to make the reader realize that a great many specialized machines are required to perform all this work.

First of all we shall mention the sawing machine. The high standard of production requirements and precision has for several years now led the makers of sawing machines to produce a highly specialized set of equipment, making use of all the latest technical advances.

Using one or more diamond-studded discs, these machines work according to an automatic cycle not only for the sawing of the uncut stone, but also for the sawing of the small squares. These machines are also used for sawing other hard materials such as germanium for example.

Turning

For tunring the small squares into discs, the centreless system of truing is used. The squares, glued to each other, form a sort of irregular rod, to which a rotary movement is imparted by a rubber cylinder, and in a few seconds a cylindrical diamond-studied wheel forms the discs.

With regard to the manufacture of gems with flat surfaces, a series of machines must be used for cutting and polishing these faces in order to give the rough stones their correct thickness.

Boring

Once the discs are finished, they have to be bored. Remarkably ingenious automatic machines enable this work to be completed without any human intervention. When loaded, a suction pipe sucks up a disc and positions it in a clamp facing a diamond-tipped drill. Once the operation is over, the gem is automatically ejected and replaced by the next. In case of trouble, the machine automatically stops. An automatic machine of this kind can bore 120 holes an hour.

The watchmaking jewel is not finished until it has been hollowed out, bevelled, angle-smoothed and, in some cases, made convex. Here again we have automatic machines operating on the same principle as the above equipment, except for a few minor adaptations. A pneumatic suction pipe takes the gem to be worked on to the hollowing tool, while a second pipe removes it. A measuring device checks the work and adjusts the diamond-tipped tool according to the difference noted. The system as a whole works on the principle of cams, with completely electronic control and a meter for counting the number of parts produced. The machine can hollow out as many as 630 gems an hour, and round and bevel up to 840 gems an hour.

The work of enlarging the hole, smoothing and polishing it it performed by a diamond-studded wire passing through the gem, to which a certain movement has been given.

Naturally the high degree of accuracy demanded and the quantity of parts manufactured require not only measuring appliances and microscopes but also a number of special appliances for the numerous checks held between each operation.

For example, the thickness of the gems is measured by making them revolve round inside a drum with an adjustable slit. A particularly useful machine is the automatic measuring and drawing machine.

The watchmaking industry's exacting requirements in regard to quality and the continual increase in the strictness of tolerances have led to ever tighter checks. Instead of spot-checks as in the past, now each jewel has to be checked individually, and the difficulties experienced today regarding the recruitment of suitable staff have necessitated the use of automatic apparatuses. The machine used for this purpose measures and separates the jewels, which are transported automatically from a revolving tray to the measuring table. The instrument sorts the jewels into three categories: outside tolerance, within tolerance, and satisfactory. Each category is directed towards the appropriate container. The apparatus has a precision of 1/1000th of a mm. and the smallest tolerance that can be obtained is 1/1000 mm. This equipment is easily adjusted to all sorts of dimensions and different tolerances.

Counting

The problem of counting industrial jewels and watchmaking jewels was solved a long time ago by the use of plates with holes, a manual method that is comparatively slow, but precise.

Use has also been made of mechanical or electrical counting balances, working as a general rule by comparison. Today it can be said that the use of electrical counting machines has become general, these instruments now being highly perfected, extremely simple to use and operating automatically. The counting machine counts any kind of jewel up to dimensions of approximately 4-5 mm. The batch introduced into the machine all at the same time is separated jewel by jewel and counted electronically at a rate of forty units a second and more, with a precision greater than 1 per thousand.

The machine automatically checks itself and eliminates foreign particles, dust and debris that might be mixed with the jewels to be counted. By preselection it can count any quantity of jewels set in advance.

The machines in this article have high counting speeds (up to 100 jewels per second). They are practically free from any possibility of error and, in addition, can be adapted to various shapes and sizes of jewels.

While in Switzerland watchmaking jewels have for a long time constituted an important outlet for uncut synthetic gems, the recent rapid technical progress has led industry to make more and more use of hard resistant materials of this kind.

Synthetic sapphires are used in the manufacture of countless bearings of all kinds for various apparatuses, balances, thread guides, rollers for winding machines, balls and rollers for bearings, pivots, gramophone needle styluses, balls for ball-point pens, gauges, cutting tools, inspection windows for atomic power stations, etc. For their manufacture, all these various objects require the same machines as watchmaking jewels, and in particular the use of synthetic or natural diamonds as a cutting medium at all stages, from the first rough shape to the final super-finish.

In order to show how the Swiss synthetic gems industry leads the field in all the most modern techniques, we think it would be a good idea to devote a few lines to two typical new uses of these materials.

Thanks to the use of the crystallographic and optical qualities of the white synthetic sapphire (corundum), it has been possible to create protection windows for the solar cells used to supply energy to certain artificial satellites like Telstar in 1962. White synthetic corundum offers, in fact, the following advantages: hardness, resistance to the impact of small meteorites, permeability to a wide band of the solar spectrum, resistance of the colour of cosmic rays, avoidance of heating due to infra-red rays, and great molecular stability.

The same Telstar used another jewel for the reception of its signals on earth, the red synthetic corundum or synthetic ruby, a corundum containing chromium and known by the name of *MASER*. This technique uses the specific oscillations of matter at a temperature approaching absolute zero, for the purpose of eliminating background noise.

Under the name of *LASER*, the same ruby is used for the amplification of light. A first experiment shows that a ruby with a diameter of 5 mm., excited by a flash lamp, projects to a distance of well over half a mile a red luminous spot easily visible to the naked eye. In view of the smallness of the transmitting surface, one realizes the tremendous energy developed. It is already possible now to transport energy without a cable and to great distances.

Leaving the rigours of precision and the icy regions through which Telstar orbits, we come to the gentler field of the synthetic jewel used as a gem for ornamentation, a piece of jewellery, a decoration for our watches.

Unfortunately in this field the Swiss machinery industry offers very little, each gemstone manufacturer having developed his own equipment for his own purposes. We can nevertheless indicate to the reader a machine for cutting and polishing the facets one by one and a machine for cutting and polishing the facets in series and semi-automatically.

While all roads lead to Rome, the synthetic jewel inevitably leads us back to watchmaking by way of facetted watch glasses. Replacing glass or plastic, they give the watch for which they are used not only an incomparable brilliance and neatness of line but also wonderful resistance to wear and shocks.

The ingenuity of synthetic jewel manufacturers has succeeded here too in giving this typical exporting industry an additional argument in its favour, an added element in support of the quality of Swiss watches.

Swiss machinery for the manufacture of jewellery

On the whole, jewellery is a branch that has been neglected for a long time now by machinery manufacturers. Actually, jewellery used to be manufactured entirely by hand by jewellers who created the whole object themselves from the original drawing to the finished article.

Today, very large quantities of jewellery are made by machine. Consequently, we thought it necessary to complete the present article with a short survey of a number of highly specialized Swiss tools which have rapidly made a name for themselves in all countries and possess the common feature of using a diamond as cutting medium.

In fact, present production requirements have led tool manufacturers to use increasingly resistant materials permitting a higher output and a better surface finish. Thus the natural trend has been to progress from tool steel to highspeed steel and hard metals, like widia for example, then on to ceramic and diamond-studded discs.

The machines in which we are interested here are used for decorating jewellery, and the final products bear no resemblance to the jewellery articles manufactured by other means. The new methods are used for the decoration of watch cases, watch straps, watch dials, rings, bracelets, cufflinks, medals, etc. The diamonds used for jewellery making tools are stones of the very finest quality; it is possible to cut jewels in sections for carrying out extremely

important operations. These machines and tools owe their great success to the high degree of rationalization made possible by the quality obtained with this process and the speed of operations on jewellery.

To go on to other methods of treating the surface of metals, there are the process known as sand-blasting (projection of abrasives) and the shotting method (projection of fine metal shot). These systems are used for cleaning and finishing metals. The Unibloc 70 automatic machine is designed for the mass treatment of small items and offers a working space of 0.7 × 0.5 × 0.4 metres.

In the same category can be included the various sprayers such as those made by another Swiss firm.

The decoration of jewellery by chequering and engraving is carried out under the best possible conditions by multiple machines equipped with several tools.

Finally, let us also mention the equipment for the continuous soldering of gold whatever its title or colour, made by a manufacturer in Bienne, type *HLBO*. Thanks to new processes and highly developed automation, even unskilled labour is fully capable of operating these appliances, and the objects are soldered or reheated without affecting the polished surfaces.

"Swiss Industry and Trade."

APPOINTMENTS

Federal

The Federal Council has appointed:

Dr. Fred Bieri from Schangnau, former Ambassador to Indonesia, as Chief of the *Abteilung für Verwaltungsangelegenheiten* of the Federal Political Department. This is in succession to Minister Max Graessli who has been called to United Nations Organisation as leader of a group of experts to study the economic position of Panama.

Oberrichter Dr. Walter Buehler (Zurich) as *Obmann* of the Federal *Einigungsstelle.*

Ambassador Dr. Edwin Stopper (Winterthur) as President of the Directorate of the Swiss National Bank. This is in succession to Dr. Walter Schwegler.

Dipl. Ing. Fritz Locher from Hasle/Burgdorf, as General Manager of PTT, in succession to Dipl. Ing. G. A. Wetsttein.

Dr. Riccardo Motta as President of the Banks Commission, in succession to former Federal Councillor Dr. h.c. H. Streuli.

Dr. iur. Theo Kaeslin, Lucerne, as a new Director of the Federal *Flugunfall Untersuchungskommission* in succession to Dr. Werner Guldimann.

Dr. Hans-Peter Moser as Clerk to the Federal Tribunal.

Fuersprecher Dieter Metzger as Secretary to the Federal Tribunal.

Fuersprecher Dr. iur Heinz Masshardt as Chief of the Section *Wehrsteuer* of the Federal Tax Administration.

Alfred Corbat as Delegate of the Federal Council on the Guiseppe Motta Foundation.

Dr. H. R. Denzler (Zurich), as Secretary of the Swiss *Schulrat,* in succession to Dr. iur H. Bosshardt.

Other federal appointments:

Albert Masnata, Manager of the Swiss Office for the Development of Trade and Commerce (OSEC), has been called to the UNO Technical Assistance Service as expert in connection with the development of Panama.

Dr. iur. Peter Saladin (Basle), has been appointed Secretary of the Swiss Science Council.

Diplomatic

Dr. Walter Bossi, Ambassador to Tunisia, as new Ambassador to Venezuela, Trinidad and Tobago. This is in succession to Ambassador Turrettini.

Monsieur Th. R. Curchod as Ambassador to Kongo and Gabun, following Ambassador Marcionelli.

Ambassador André Dominice, accredited to Lebanon, Syria, Irak and Jordania, as Ambassador to Kuwait.

Ambassador B. de Fischer, Great Britain, also appointed as Ambassador to Malta.

Divisional Commander Col. Carlo Fontana as Military and Air Attaché in Rome and Madrid.

Monsieur Henri Quioc as Consul-General in France.

Vice-Consul Michel Paratte as Consul in Catania.

Monsieur André J. Poncini as Consul in Port Louis (Mauritius).

Consul Werner Jost as Consul in Trieste.

Consul Guillaume Hurni as Consul in Annecy.

Various

Councillor of States Dr. Willy Rohner (Altstaetten) as President of the Swiss Tourist Federation, in succession to Federal Councillor Gnaegi.

Dr. Robert Hoerni (Vandœuvres, Geneva) as President of the Delegates' Assembly of the Swiss Evangelical Church Federation.

Paul Klecki as Chief Conductor of the " Orchestre de la Suisse Romande " in succession to Ernest Ansermet.

National Councillor W. Bringolf as new President of " Schweizer Tibethilfe ".

Miss (Dr.) R. Buser, Liestal, President of the " Schweizerischer Alkoholgegnerbund ".

Fritz Buehler, Zurich, as new Chief of the Swiss Alpine Rescue Service in succession to Dr. E. Biedermann.

Col. Josef Burkhard, Cantonal Police Commandant, Lucerne, as new President of the " Schweizerischer Schützenverein ".

Erich Gygax as new President of the " Verband der Handels,- Transport- und Lebensmittelarbeiter der Schweiz ".

Pfarrer Hans Baettig (Captain), Solothurn, as new President of the Society of Army Padres.

Blaise Clerc, Notary in Neuchâtel, as new President of the Swiss Watch Chamber, in succession to Col. Edgar Primault.

Dr. iur. Reinhard Isler, Zurich's *Staatsschreiber,* as Chief of the administrative section of NOK (Nord-Ostschweizerische Krafwerke A.G.).

Jean-Yves Eichenberger as new Director of the Centre for Industrial Studies in Geneva.

Dr. Heinrich Oswald as new General Manager of Knorr Naehrmittel A.G., Thayngen.

[A.T.S.]