Volume 21 Number 1 Spring 2003
Edited by Alan Pratt

The Music Box

An International Journal of Mechanical Music

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The Journal of the Musical Box Society of Great Britain

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Please return this completed form to Roy Ison
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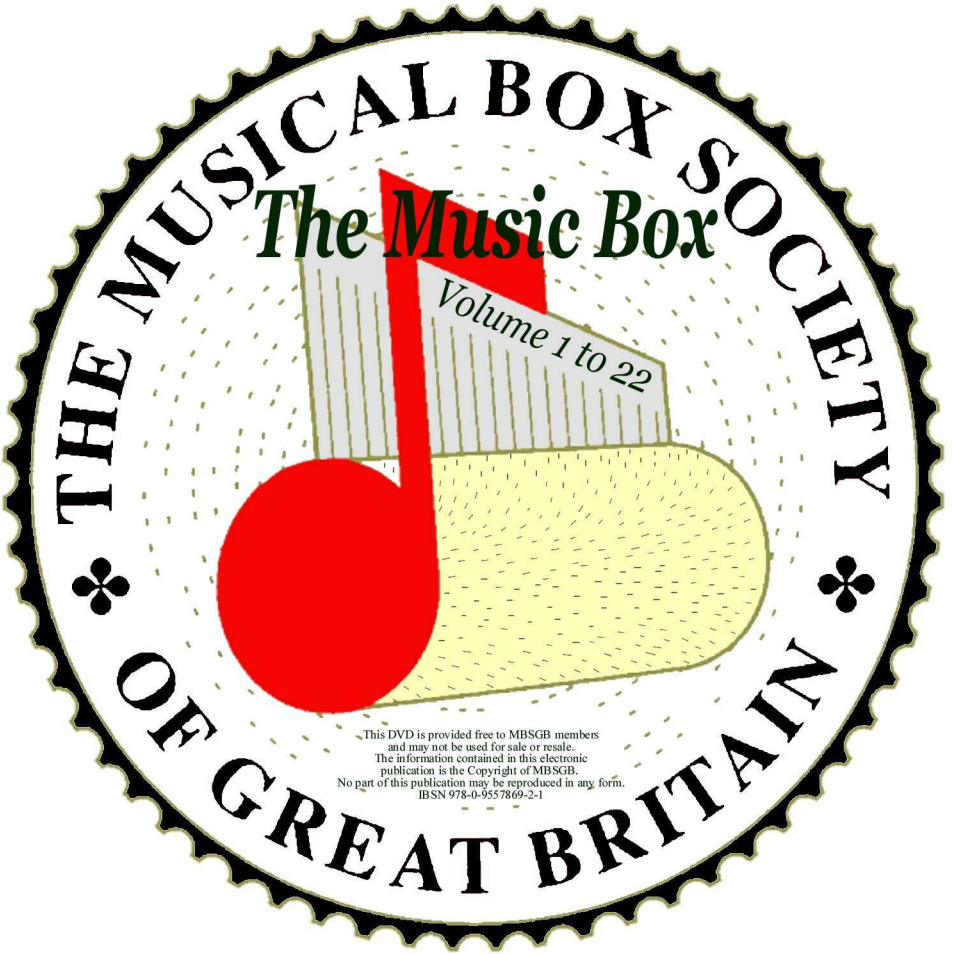

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Net Result

Alan Pratt

I have recently been looking at web sites around the world devoted to mechanical music, and the level of activity is amazing.

Instruments are still being discovered - and subsequently restored - and the range of music rolls and books being cut grows almost daily. In this issue of The Music Box there is a report on work to create new 'cobs' for Gem roller organs. Isn't it amazing how technology almost a century old has had to be re-invented in order to create new music for these ubiquitous instruments. Not for the first time, I marvel at the ingenuity of those early mechanical music pioneers who, without any previous model to follow, developed playing systems which even today require much work to reproduce.

Looking at recent auction results (also through the web) there seems to be a resurgence of interest in automata. For some time these mechanical marvels seemed to go 'out of fashion'. and many lay neglected in cupboards or attics. At the recent auction in Chartres-France (December 2002) the automata lots were most in demand and most appear to have commanded good prices.

By comparison, many cylinder musical boxes achieved what can only be described as very modest prices. This pattern is repeated with only the very finest or most rare instruments reaching the prices of a few years ago.

But I think most of us buy instruments because we like the sounds they make. There will always be areas of mechanical music being re-discovered, but for the enthusiast these swings in popularity are irrelevant, although with prices being down a little this may be a good time to acquire some additions to your collection.

My thanks go to all the contributors to Music Box whose articles have given us such an interesting and varied read over the last year. More of the same is planned for this year and, as always, your comments and suggestions are welcome. Personal thanks for those of you who sent Christmas cards. It's difficult to reply individually, but I assure you that each and every one is greatly appreciated.

A little belatedly, may I wish all members a happy and healthy New Year on behalf of myself and all the committee. ■ *Editor*

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Our cover picture

A fine Lambert smoker, from the collection of the late Grace Thompson, sold at Christie's in October 2002 for £4,935, despite damage to the bisque head. Playing one air, he turns and nods his head, swings his cane and smokes nonchalantly by means of bellows concealed in the base, Circa 1890.

Photo courtesy Christie's of London

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Website: www.mbsgb.org.uk E-mail: mbsgb@reedman.org.uk

society news and topics

OFFICERS OF THE M.B.S.G.B. AND THEIR DUTIES

President: **Christopher Proudfoot**
The Old Rectory, Fawkham, Longfield, Kent DA3 8LX
Tel: 01474 707513

Joint Vice President: **Coulson Conn**
432 Old Forge Road, Media, Pennsylvania PA 1906 USA
Tel: 610 459 067

Joint Vice President: **Paul Bellamy**
46 Longfield Avenue, High Halstow, Nr. Rochester. Kent ME3 8TA
Tel: 01634 252079 E-mail: bellamypaul6@aol.com

Subscriptions Secretary & Treasurer: **Richard Kerridge**
32 Queens Road, Reading, Berkshire RG1 4BA
Tel: 0118 957 7453 E-mail: edwinsmith@btinternet.com
To whom all subscriptions and subscription enquiries should be addressed.

Membership & Correspondence Secretary: **Alan Wyatt MBE**
MBSGB, P O Box No 299, Waterbeach, Cambridge CB4 8DT
To whom all applications and queries relating to new membership should be addressed and to whom all general correspondence should be sent.

Meetings Secretary: **Roy Ison**
5 East Bight, Lincoln LN2 1QH
Tel: 01522 540406 Fax: 01522 520782 E-mail: ison@bight.demon.co.uk

Recording Secretary: **Arthur Cunliffe**
c/o The Editor, as below.

Editor: **Alan Pratt**
6 Kingscote Road, Dorridge, Solihull, West Midlands B93 8RA
Tel: 01564 775000

Archivist: **Kevin McElhone**
47 St John's Road, Kettering, Northants NN15 5AY
E-mail: kevin_mcelhone@hotmail.com

Auction Organiser: **David Walch**
11 Harford Close, Bristol BS9 2QD

Advertising Secretary: **Ted Brown**
The Old School, Guildford Road, Bucks Green, Horsham, West Sussex RH12 3JP
Tel: 01403 823533

Committee members:
Robert Hough
Aeolian Court, Chudleigh, Devon TQ13 0EE
Tel: 01626 853502

Hugh Morgan
27 Middleton Street, Wymondham, Norfolk NR18 0AE
Tel: 01953 603462

Daphne Ladell
The Hollies, Box Hill Road, Tadworth, Surrey KT20 7LA
Tel: 001737 843644

Website: www.mbsgb.org.uk

E-mail: mbsgb@reedman.org.uk

New Members

We are pleased to welcome the following new members to the Society:-

2818 Dr Michael Walker, Tyne & Wier
2819 Robert Goodey, Hants.
2820 Danilo Knovalinka. ME USA
2821 R. E. Blain, Staffs.
2822 Mike Cole, Dorset
2823 Geoffrey Davis, Somerset
2824 Ms A. Linden, Berks.
2825 Peter Mulder, Holland
2826 Timothy Reed, USA
2827 A. Rigg, Co. Durham

Sussex Open Day - Christmas 2002

The year 2002 is reputed to have had one of the wettest Novembers on record. The conditions persisted into the first part of December making for a miserable journey to The Old School where the only MBSGB Christmas meeting was to take place. However, the cold and the drizzle were soon forgotten and the endurance of some forty travellers was amply rewarded as we gathered to renew friendships, meet with new acquaintances and lose ourselves in the magic of our mechanical music interests.

Self styling himself as an 'entertainer', Anthony Bulleid told us (with a twinkle in his eye) that he would soon be acting entirely within character, by retiring at least three times as he gradually eases himself out of regular involvement with the Chanctonbury Ring group. He then offset our disappointment by taking us through the history of his epic work on tune sheets, including the selection criteria he applies to determine if a new discovery merits inclusion. For example, he never includes an unused tune sheet because, in the same way as a blank birth certificate is not a certificate of a birth, then a blank tune sheet is not a tune sheet!

Ted Brown's musical dictionary of the 1890s had been scoured for any reference to the approaching festive season, the nearest being Christmann. Born in 1725, organ builder Franz Xavier Christmann appears to have had something of a reputation. Construction of his 'monster organ', near Linz, was apparently started in 1770 but was not completed until 1837. A further two of his organs had very short lives, each being destroyed by fire! It was left for each of us to judge his career success, but nobody was mathematically astute enough to realise it had taken him 67 years to build his monster when he had only lived for 70 years. Perhaps the ghost of 'Christmann Past' carried on the good work after his death!

We were introduced to the story behind yet another Austrian organ, this time the one in the town of Oberndorf, location for the composition of 'Silent Night'. Our source of information did not clarify if mice in the bellows or rust in the linkages was responsible for silencing this organ. Whatever the cause, this failure led directly to the adoption of Mohr's poem, hurriedly set to music by the temporarily redundant organist Gruber and performed to the accompaniment of a guitar. The absence of a guitar and guitarist at our open-day did not impede enjoyment of this carol, which was played on almost every instrument in Ted's collection and on several brought by visitors. Other carols and Christmas music were much in evidence. One somewhat unusual arrangement which managed to convey the feelings of the season was the Porter disc 'Christmas Bells' played on a 15½ inch Regina.

Novelties, more novelties and yet more novelties gave rise to much hilarity, comment, jeering and jostling for the best view, as the afternoon progressed.

It may be concluded that there was a somewhat light-hearted atmosphere to the whole of this memorable day. Add the superb refreshments, provided by the stalwart band of helpers (many thanks) and it is clear the weather didn't matter a dam-p!

Future Chanctonbury Ring meetings will be on 23rd March and 25th May. Please contact Ted Brown if you would like to attend.

Dijon International Festival of Mechanical Music

We have received a note from the organisers of the Dijon International Festival of Mechanical Music.

The Festival runs from Thursday September 25th to Sunday 28th, 2003.

You can get more informational from: DIJCOLORG, 4 bis, Rue Auguste-Comte, 21000 Dijon, France. Or e-mail dijcolorg-music@libertysurf.fr

AGM and Auction

Our Annual General Meeting this year will be held at Roade, Northamptonshire. The location is on the A508, just off junction 15 of the M1. Full details in our next issue but make a note of the date in your diary – Saturday 7th June.

Spring Meeting 2004

Although we have had to announce the sad death of Brian Campsie, who was to have been our host for this meeting, the considerable work that he had done will be continued. The dates are May 7 – 9th 2004 and the venue the Abbots Barton Hotel, Canterbury. Two visits are already arranged for the Saturday. More news nearer the time. ■

Music Box Index

With the completion of Volume 20, preparation of the Index is now well advanced. It is anticipated that your copy of the Index will be enclosed with the next issue of The Music Box in April.

Spring Meeting - Birmingham

4 - 6th April 2003

Birmingham was once the powerhouse of British industry, making its name whilst mechanical music's popularity was at its zenith. Our base for the weekend is the three star Quality Hotel, which has 215 rooms, ample secure parking and a health club with swimming pool free to all residents. It is situated on the A456 and is easily accessible from all of the major motorways.

John Harrold is opening his collection on Sunday for a limited number of interested members.

Directions

BY CAR (If you do get lost, which is unlikely, please telephone: 07947 893661). From the M5: Leave at J3 for the A456 signed "Birmingham (W & Cen.)". From the South turn right (3rd exit), or turn left (1st) if coming from 'The North', onto the A456 heading for Birmingham. On the Urban Clearway go straight over (2nd exit) of the Quinton Development Park roundabout continuing on the A456. After a road tunnel at the next roundabout by the Carvery Pub carry straight on down the A456 signed "City Centre, Edgbaston and Bearwood". Continue over the next set of traffic lights by The Amber Tavern, moving into the middle lane at the traffic lights with the junction with the A4030. Carry straight on down A456 towards the city centre and continue over the "Norfolk Cross" traffic lights. Once you have passed the Apollo Hotel on your left, the Quality Hotel is the beige coloured building on your right opposite the branch of Donald and Aitchison and after TGI Fridays.

From the M6 (This route is closed after 21:00hr): Leave at J6 (Spaghetti Junction) signed for "Birmingham Cen. and NE", move into the lane marked "M6, A38(M) and A38". Follow signs for "A38(M) Birmingham Cen. "onto the Aston Expressway – a lane signal controlled road. Move into 2nd and 3rd lanes for Birmingham City Centre, keeping on A38(M) until you go under the St. Chads Queensway road tunnel, at which point move into inside lane. Leave the A38 following directions towards "Convention and Museums". Continue along Great Charles Street, then move into outside lane marked on road surface "A456 and A457" as you go under a tunnel after the sharp left. Leave onto Broad Street signed "A456, ICC, NIA and Symphony Hall". Continue to drive between the Hyatt hotel and the ICC complex, and go down the Five Ways road tunnel signed "A456, M5, Kidderminster, Dudley and Wolverhampton. "Carry on down driving past Edgbaston Social Club, Spearmint Rhino, Calthorp Estates

and go straight over the traffic lights following signs for "Bearwood". Once you have passed Zurich Insurance the Quality hotel is the beige brick building on your left opposite the Edgbaston Thistle Hotel and it is just after The Garden House.

By Rail

Birmingham's main railway station, New Street (services by Central Trains, Virgin, Welsh and Borders) is 2 miles from the hotel. This can be reached by either taxi from the rank outside the station, by the No 9 bus or e-mail me for a lift: WARDjohnLawrence@aol.com.

By Coach

The National Express has a depot at Digbeth, three miles from the hotel. Then take either a taxi or bus. If you require a lift please e-mail me.

By Air

Birmingham International Airport is well serviced by the major airlines connecting it to the four corners of the globe as well as many internal flights. The excellent rail link from Birmingham International Station, and regular bus services will enable you to get to the meeting. ■

PROGRAMME

Friday 4th April

Dinner	
20:00	Demonstration of the instruments of local members
21:00	Talk by John Harrold – 'Musical Box Comparison'

Saturday 5th April

07:00-10:00	Breakfast
09:30	Registration
10:00	Ted Brown – 'It doesn't have to cost an arm and a leg'
10:30	Coffee
11:00	Christopher Proudfoot – 'Gramophones: The Pursuit of Portability, 1897-1960'
11:30	Nicholas Simons – 'How to build an Orchestrion in thirty minutes flat!'
12:00	Lunch
14:00	Visit to Birmingham's recently renovated historic canal side for a Heritage Canal Cruise plus the chance to see Symphony Hall and other attractions.
19:00	Drinks
19:30	Society Dinner
	Entertainment – 'To be advised'

Sunday 6th April

07:00-10:00	Breakfast
10:00	Coulson Conn – 'Bastard Disc Musical Boxes'
10:30	Coffee
11:00	Keith Reedman and Joan Rippengal – 'Beautiful Soup'
11:30	Paul Bellamy – To be arranged
12:00	Concluding remarks – President, Christopher Proudfoot

The Lakeland Meeting

September 12-14th 2003

The Heaves Hotel Nr. Kendal

Overflow Accommodation at the Gilpin Bridge Hotel Nr. Kendal.

The meeting has the provisional agenda arranged as follows: -

Friday 12 September

There will be a tabletop sale after the evening meal. Please bring any items you wish to sell clearly marked with your name and the price required.

Saturday 13 September

Registration. 9.30. Bookings for a sandwich lunch must be made at this time.

10.15. The sound of the overture box. Arthur Cunliffe.

10.40. Coffee break.

11.00. Organettes. Ted Brown and Nicholas Simons will entertain us with their famous double act.

12.00. Lunch.

2.00. Visit to the Steamboat Museum at Windermere.

7.30. Society Dinner.

There will be a Society Raffle on this occasion. Some excellent prizes, including automata, have already been offered.

Sunday 14 September

9.45. Talk on mandolin boxes and multiple comb boxes. Various speakers.

11.00. Coffee.

Depart from hotel around midday please.

The booking form for this meeting will be available in the next society journal. Members are advised that it will be essential to make an early reservation.

Extended Story

Many members find that travelling great distances to attend a 2 or 3 day meeting, rather tiring and costly in fuel for such a short stay. With this in mind, I hope to extend the scope of this meeting by including a holiday break for those who are able to take advantage of this idea.

I have reserved every room in the Heaves Hotel for the entire week commencing Monday 8 September 2003, so that members can book in for a mini break in the Lake District from Monday to the Thursday to "do their own thing." The Management of the hotel have quoted me a special price for bed and breakfast of £30 each per day and the manager is prepared to arrange lunches and/or dinners as required on a daily basis at a reasonable extra cost. The Heaves is a small family run hotel with only thirteen double/twin bedrooms available and one single room. Bookings must be made on the booking form and will be taken on a first come first served basis. Please do

not apply directly to the hotel, as they will simply refer you back to me.

This idea is a departure from our normal meeting arrangements and is quite untried. It should provide an opportunity for members to meet in a relaxed environment with ample time to renew established friendships in an informal manner without having the general public getting in the way! I will try to provide leaflets and/or brochures of the various attractions of the Lake District to help in the planning of your holiday

Each evening at the hotel after the evening meal, there will be an opportunity for those who wish to hold an informal gathering and talk about mechanical music. Already envisaged are talks and demonstrations on the following topics:-

a) Musical Clocks. b) Musical miniatures. c) The Sublime harmonie sound. d) Unusual disc machines. If anyone is prepared to bring an instrument along and give a demonstration, please let me know in advance. This will be most welcome.

If you wish to take advantage of the four day break prior to the meeting, please complete the A5 form which is enclosed with this issue and return as soon as possible as accommodation is limited. Remember, you must also complete the usual meeting Booking Form (for the Friday to Sunday period) which will be in the April issue of The Music Box. Bookings will be accepted on a "first come" basis - you will be notified by telephone that vacancies are available. Please do not contact the hotel directly.

For the weekend meeting it may be necessary for some members to stay at other hotels on a bed and breakfast basis and their fees may vary a little. These hotels will not be a great distance from the Heaves Hotel. The maximum number the Heaves Hotel can cater for a Society dinner is 73. I hope members will understand the difficulties in trying to organise such a meeting in a district where large hotels are difficult to find.

I know some members have caravans and motor homes. Here is a chance to book in a very secluded Caravan Club site at Low Park Wood, which is no more than 300 yards away from the Heaves Hotel. You will of course have to pay the Registration fee and for the Society dinner, but are welcome to come to all the talks and events. ■

Arthur Cunliffe

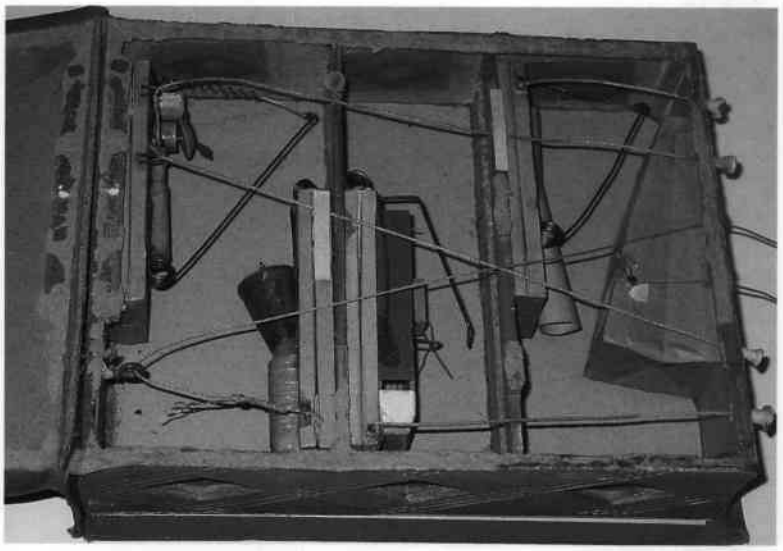
Chanctonbury Ring

The latitude of 'plus or minus a bit' either side of the magic eleven-inch size, enabled us to enjoy performances from a wide range of disc boxes at our January meeting. These included a single comb Stella, a Mira twin comb with speed control, single and double comb Polyphons, and a table model Britannia. Then there was a Troubador, a Helvetia and a very capable little Lochmann; forlornly looking for it's long lost cabinet. This latter item was a twin comb version arranged to give two plays before the stop mechanism engages. In conclusion we heard a new Reuge disc box of similar size. There were obvious and expected tonal differences between these instruments, giving rise to the thought that the original serious purchaser of the instrument must have faced a similar dilemma to that of the modern audiophile searching for new loudspeakers. In theory they should be the same but each type imparts its own sonic characteristics. It is all down to the individual - some you like and some you like more!

Anthony Bulleid's presentation covered the early years of cylinder box manufacture in Switzerland, even down to the class structure of the inhabitants of Geneva and the different roles they played in the development of the industry from watches to musical boxes.

The Dutch artist Anton Pieck is well known for his oils, watercolours and etchings, many of which include subjects of mechanical music interest. Light-heartedly we played 'Search for the instrument in the picture' and more seriously we learnt of an avid collector who has more than 1200 of this artist's pictures.

There was a rare opportunity to view the internal mechanism of a speaking picture book currently being restored and to see the devices used to imitate the various animal sounds.



For the file called 'Talking book mechanism' The mechanism which makes the animal noises from a talking book.

Chanctonbury Ring *(cont'd)*

With much huff and puff, Ted Brown took us through the 1925 invention of the Rollmonica by Joseph Le Roy Banks. Contained in their characteristic orange and black boxes, these instruments and their rolls were to tumble in price in a short number of years, from $2.50 for an instrument with one roll to $1.00 for an instrument with 10 rolls. Was it excessive profit in the early days or the hard old commercial world following the 1930 Wall Street Crash that was responsible for such a sudden and dramatic reduction? He also demonstrated his Herophon organette.

One of our group demonstrated new aluminium discs he is arranging and punching for the 24 note Atlas organette whilst two others synchronised their playing of two different arrangements of the same tune, on a pair of Gem roller organs. Without prior rehearsal they managed to finish at the same time even if the start was a few milliseconds apart!

All this plus hot soup, sandwiches, Spotted Dick and chocolate sponge pudding, ably provided by the catering team, and we can truthfully say we had a very satisfying day.

The main subject for the meeting to be held on 23rd March is 'Cylinder boxes you like'. Don't forget to telephone and reserve your place because these ever-popular meetings can quickly sell out. There is a finite capacity. ■

Next Open Day 18th May.

A rare glimpse of Ted Brown preparing one of his instruments for demonstration!

Barrel Organs from Odessa (Russia)

There's truth in the joke that jazz was born in Odessa. In any case, the culture of street music is deeply rooted here. By the middle of the twentieth century every self-respecting tavern had its own band (violin, clarinet, flute, horn, bass fiddle, and drum) or a "musical machine," that is, a mechanical organ. They were made in the city, at piano factories, which were owned primarily by people of German descent-Haas, Stapelberg, Raush, Opperman, Vitsman, Gershgeimer, Hek, and others.

Odessa pianos and "musical machines" were distributed throughout Russia. One popular instrument was the sharmanka. The name comes from the first line of a very popular song, "Charmante Katharine." The Ukrainian name for the instrument, Katerinka, comes from the song, too. The sharmanka was a portable organ without keyboard, used by wandering musicians. The Odessa factories gradually learned to put several dozen popular melodies into the music box: folk songs, waltzes, and opera hits. The organ grinders usually set up near bars or "houses of ill repute" and were subjected to moralizing lectures for exploiting pretty girls of eight to ten, making them dance, tumble, and do various tricks with hoops to amuse the drunken audiences. Activists from the Society for the Protection of Animals persecuted the organ grinders for dragging around the monkeys and other exotic animals with them.

By the 1860s the sharmankas and "musical machines" of Morits Raush were available in Moscow and St. Petersburg, Nizhny Novgorod, and Warsaw and were especially popular in Tiflis, and in the 1880s another Odessite had become a major figure in that market-Kondrad Hek. And even in the early twentieth century, when wind organs were being replaced by more modern methods of mechanical reproduction of musical instruments (foremost by the gramophone), the Odessa sharmankas continued to sell well both in the empire and abroad. They were manufactured at the factory of Ivan Viktorovich Nechada, located on Balkovskaya Street, 191, where it borders on Vinogradnaya (today, Isaac Babel Street). Nechada's high-quality and beautifully ornamented sharmankas were used by street musicians for many decades, right up until the 1960s. ■

Oleg Gubar
Odessa, November 03, 2002

Odessa Barrel Organ

Behold the Lowly Snail

by Robin Biggins

This article first appeared in Mechanical Music - the Journal of the MBSI and is reproduced with the kind permission of Robin Biggins and MBSI Editor Rosanna Harris

There are many components on cylinder musical boxes that are so common that we tend to take them for granted. The basic design remained unchanged for about 180 years, so we tend to say, "Well, they all do that," without much thought about how they do it, and how various parts evolved to perform a function that seems so commonplace.

Most cylinder musical boxes have the ability to play more than one tune, and this is accomplished by a device that can accurately move the cylinder laterally so a different program of pins can pluck the tuned comb. We have all seen the cylinders move a little bit after each revolution, and then snap back after the last tune to start over.

The movement is quite small, about .017" on average, and rarely more than .025" found on some organ boxes. By comparison, the staple that holds this Journal together is about .020" thick. If the cylinder is not moved the exact distance that is required, interference with other tunes or poor tonal quality will result.

The early solution to moving the cylinder was to simply have a forked lever connected to the cylinder, which could then be moved a certain distance by hand. This is found on many two - tune snuff boxes, but it is impractical for cylinders that may play up to 12 tunes. Figure. 1 shows a device on the underside of a very early four tune machine that is in the form of a threaded shaft, turned by a knob at the front of the case. As the shaft is screwed in, the stepped brass sleeve forces the "L" shaped lever to move the cylinder sideways to change tunes, but there is no positive detent to tell when the lever is properly located or which tune is selected.

What was needed was an automatic device that would move the cylinder to the next tune after the previous tune was complete, and continue the process until the last tune was played before returning to the first tune.

The answer is the tune change cam, most commonly known as the "Snail Cam," because some of them do have a shape that resembles a snail. These devices are very old, and can be seen on early barrel organs and carillons that require the pinned barrel to be moved sideways to play a different tune. Figure. 2

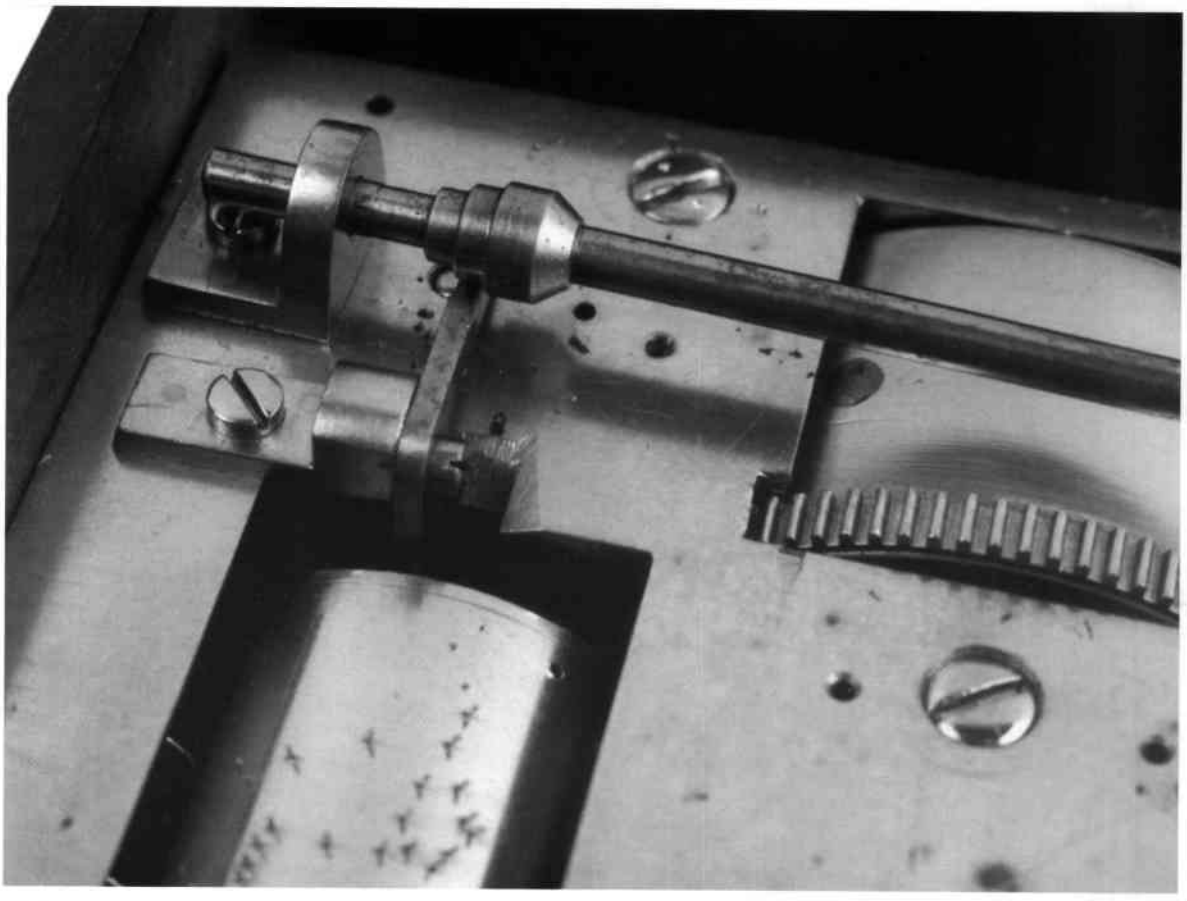


Fig. 1.

The basic design was unchanged for about 180 years...

shows an early cam, which is nothing more than a wedge, or ramp, that is in the form of a helix. It has projections, or teeth, that can be engaged to move the wedge a specific distance so that a cam follower would be ramped up toward the highest end and then drop back to the lowest end to start again. This is adequate for organs that have wide cylinder pins and wide spaces between tunes where accuracy is not paramount, but it is unacceptable for a music box that must move the cylinder to an accuracy of one thousandth of an inch.

Fig. 2.

Fig. 3.

The need was to move the cylinder in a series of equal, accurate steps...

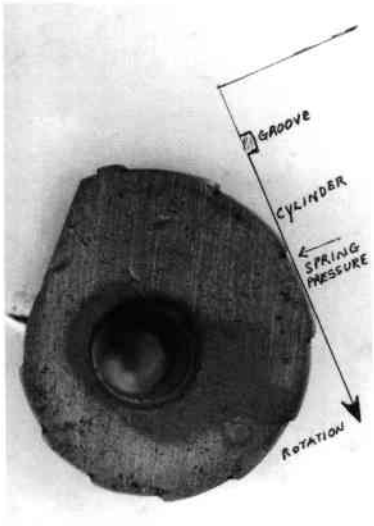


Fig. 4.

The need was to move the cylinder in a series of equal, accurate steps, and it was more practical to form these steps in a helix similar to the early snail cam described above. The cam can be rotated at the proper time by a notch in the cylinder end-cap or a pawl fastened to the bedplate. The cam itself can be found most commonly mounted on the greatwheel, but sometimes on the mainspring barrel as in some Mermod Fréres boxes or on a separate fixture, depending on the design of the machine.

Figure. 3 shows a simple design that looks nothing like a snail, but which can move a small cylinder through either two or four changes. The cam rotates around the central shoulder screw, and the cylinder is held against the flat surface by a light spring. The distance of the flat from the screw is different for each flat, and this determines how far the cylinder is moved. As the notch in the cylinder end-cap passes the corner of the cam, it turns it to the next flat, or tune. This cam is for four tunes, but a two tune cam would still have four sides, with opposite sides being equal distance from the centre screw so the sequence repeats.

Of similar, but more complicated design, is the cam used on many Mermod Fréres machines as in Figure 4, and this one does look a bit like a snail! This is a 10 tune cam, and instead of flats it has a curved profile to each step so that the cylinder rides on two adjacent bumps. When the notch in the cylinder comes around at the end of the tune, the leading bump drops into it by virtue of the cylinder pressing against it, and the cam is turned to the next tune. To prohibit

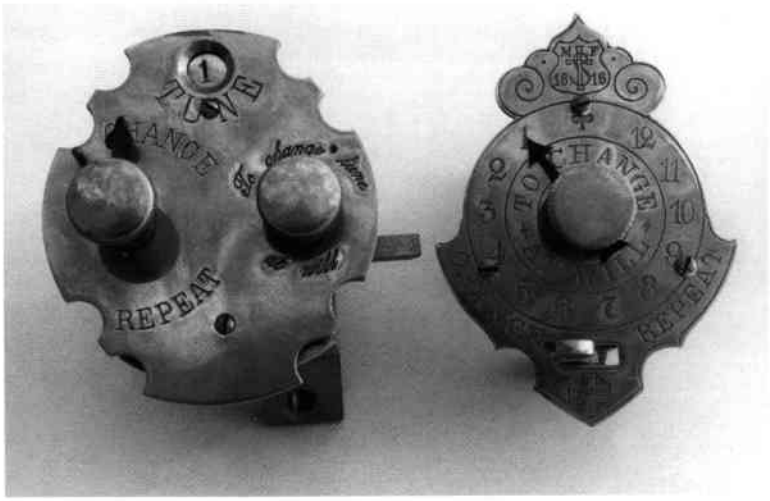


Fig. 5.

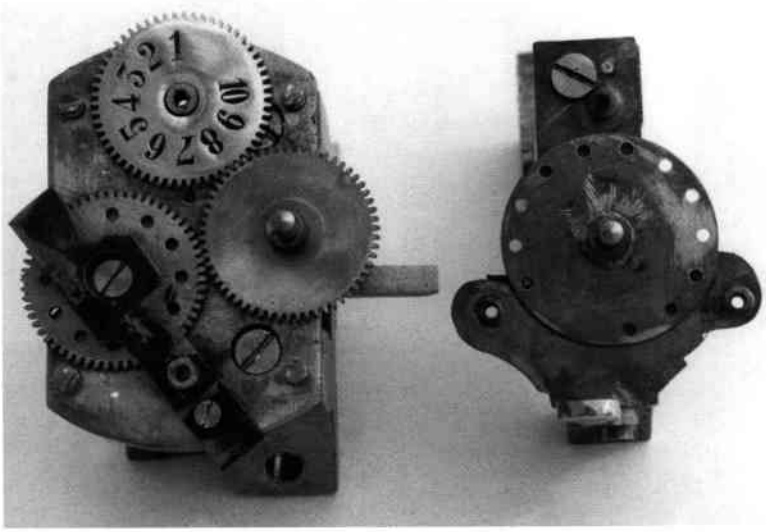


Fig. 6.

Fig. 7.

the cam being changed manually in the middle of a tune, the mechanism is fitted with a locking peg which is released only at the end of the tune by another bump on the cylinder end plate.

Figure. 5 shows early (on the left) and late Mermod combination change and tune indicator mechanisms, and Figure. 6 shows them with the covers removed so you can see how the design was simplified. The holes in the disc (which is attached to the cam) are for the locking pin, and the cam is underneath and not visible. The "Change - Repeat" lever simply locks the disc in place if you want to repeat a tune.

The most common snail "Helix Spasmodicus", is usually mounted on the inner surface of the greatwheel, but a large version "Helix Humungus" has been mounted on the mainspring barrel of the direct drive Paillard Columbia (Figure. 7) in such a way that the end of the cylinder shaft contacts directly with the cam face. In each case, there is an adjustable pin or block protruding from the end of the cylinder that is held in contact with the cam, so that as the cam is turned, the step-up moves the cylinder laterally against a spring so it aligns with the next pinned tune.

These cams are turned as the greatwheel rotates and one of the points comes in contact with a fixed pawl screwed to the bedplate. This pawl can usually be moved out of the way in order to allow the tune to repeat. Figure. 8 shows two different cams which rotate around a central shoulder screw. Usually, there are the same number of points as there are steps on the cam, but you will notice that on the larger cam there are six points but only three steps, which then repeat. It is difficult to make a three point cam operate satisfactorily on a large machine, although you do see them on small mechanisms. The small cam is from a two tune machine, and has four points so the tune sequence repeats. It would not be possible to make a two point cam. Also on the small cam, the steps ramp up in the opposite direction because the greatwheel is on the left instead of the right, so it gets turned counter clockwise.

The most common snail is usually mounted on the inner surface of the greatwheel...

Figure. 9 shows a twelve tune cam, which has twelve points, and it is easy to see how each step rises up to move the cylinder a specific distance, then at the end it drops back down to the first tune.

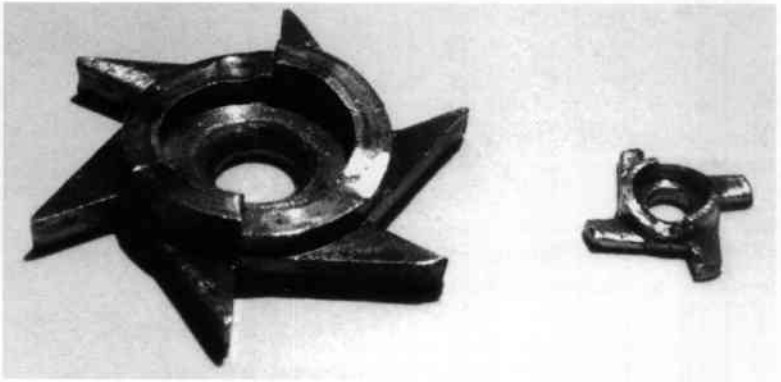


Fig. 8.

The problem is, that after the last tune the cylinder return spring pushes the cylinder back to tune number one with considerable force, and on a twelve tune mechanism it gives a thump that is enough to make your heart skip a beat! It could also cause damage over time to the cam, so the last step is notched down half way so the return is in two steps. There is often another steel post on the cylinder that contacts the greatwheel at the same time, so the cam does not take such a licking.

Now, if only someone would have taken note of a very clever cam on an early Nicole Fréres eight tune movement, all of this could have been avoided. Figure. 10 shows the steps go up one side and down the other! Although the tune card lists the tunes in the order in which they are played, the cylinder moves in the sequence 1 3 5 7 8 6 4 2 1. This way there is no sudden thump at the end and no stress on the mechanism. I am surprised it does not appear on later Nicole machines, but perhaps they either had manufacturing difficulties, or they thought one big thump was better than four little ones!

The pawl that turns the cam one point for each revolution of the cylinder has to be accurately placed so the change occurs when the comb is in the gap between tunes. It also has to be indexed so it moves the cam point just the right amount for one step. This is very critical, particularly on a twelve tune machine with very narrow steps. Figure. 11 shows a cam point contacting the pawl, but this is a rather novel arrangement in that the pawl can be moved out of the way independently of the bar on which it is mounted. The bar is fixed at one end, and located on a peg, so that when the cylinder is at rest at the end of a tune, the bar can be raised up by a separate control lever to advance the cam one step at a time for manual tune selection. Figure. 12 shows the lever that can be moved independently of the bar to pull the pawl out of contact with the cam for repeat play.

There are many features of the music box mechanism that belie the means to the end, so next time you watch a music box play, and say "Well, they all do that!" You are probably right. But how? ■

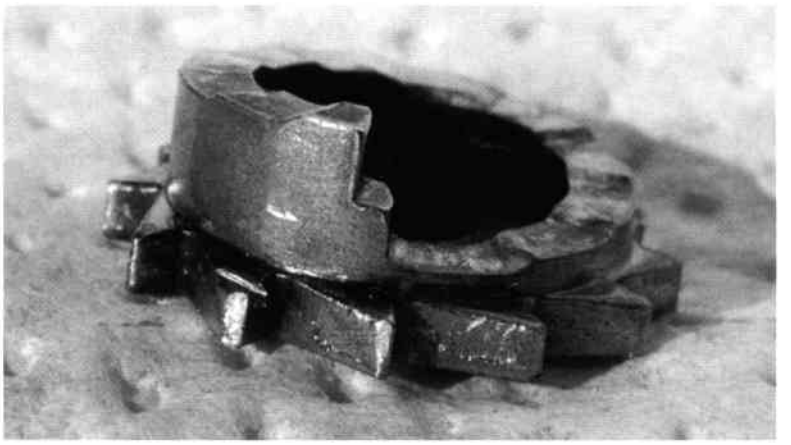


Fig. 9.

Fig. 10.

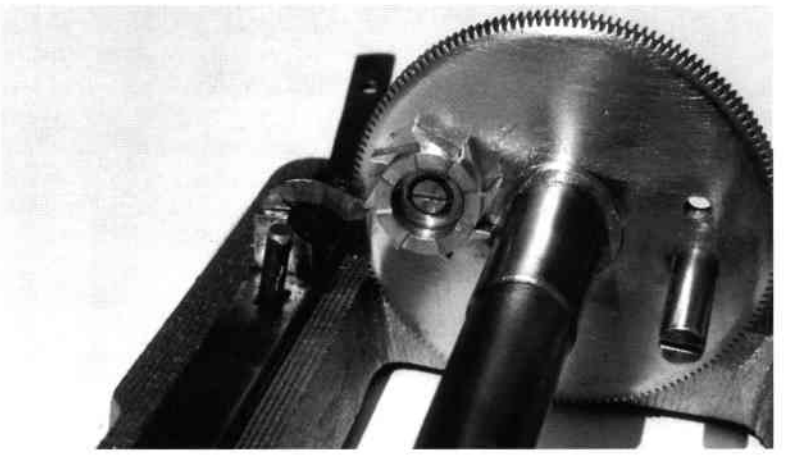


Fig. 11.

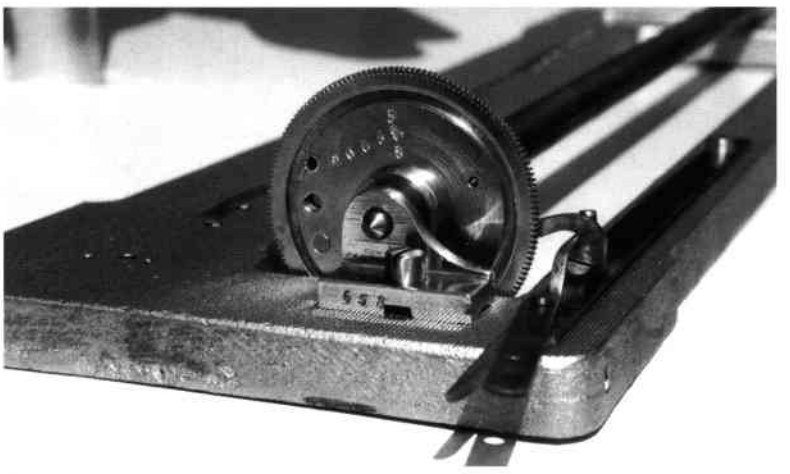


Fig. 12.

On the Origin of the Pneumatic Singing Bird

Does the answer lie in Byzantium? by John Ward

Have you heard the story about the Bishop and the bird?

Don't panic, I am not about to launch into a rude joke, rather I am going to look at the history of the pneumatic bird and its rather murky origins. When I began my first year at Birmingham University I never thought for one moment that mechanical music would ever crop up in my studies. How wrong I was. It seems that wherever you are, mechanical music is never far around the corner. As I sat in Lecture Room Three in the Arts Building on a cold November's morning scribbling away, whilst my fellow students gently snored (it was nine o'clock after all), I heard a lecture about the Byzantine World. What intrigued me was in between talking about the rise and fall of the Macedonian Dynasty, Prof. Chris Wickham attempted to show the ostentatious world of the Byzantine Court, and the importance of ritual that has nearly always been lacking in the west.

To demonstrate this, Prof. Wickham talked about the experience of a German Bishop, Liudprand, who had witnessed technical and artistic wonders at the court, including singing birds. Hearing this, my interest was aroused and as soon as I had an opportunity I would attempt to investigate this further. So with my first year completed, I began my research. What I found intrigued me, and I hope it will be of interest to you.

The man who went to Constantinople was Liudprand, who later went on to become Bishop of Cremona, a Lombardian province in what is now Italy. What has made the study of Liudprand and his mission difficult are the numerous translations of his name including: Liudprand, Luitprand and Liuprand, and also the scarcity of English translations. Like his father and step-father Liudprand went into diplomatic service, and his first success was his mission to Constantinople in 949, where he saw the singing birds. What makes Liudprand interesting, and almost exceptional, is that throughout his journey he kept a record of all the events that he witnessed. Therefore allowing us an insight into a now forgotten world, and these were chronicled in Antapodosis (or Tit-for-tat). When he got to Constantinople, he was welcomed at the court of Emperor Constantine VII Porphryogenitus on the 2nd August. It was customary for embassies to be received in state by the Emperor in the Grand Triculum Hall of the Great Magnaura Palace Complex. What Luidprand witnessed was Byzantine Court ritual at its technical peak. In Antapodosis he wrote:

"Before the Emperor's seat stood a tree, made of bronze gilded over, whose branches were filled with birds, also made of gilded bronze, which uttered different cries, each according to its varying species. The throne itself was so marvellously fashioned that at one moment it seems a low structure, and at another it rose high into the air. It was of immense size, and was guarded by lions, made of either bronze or of wood covered over with gold, who beat the ground with their tails and gave a dreadful roar with open mouth and quivering tongue. Leaning upon the shoulders of two eunuchs I was brought into the emperor's presence. At my approach the lions began to roar and the birds cry out, each according to its kind; but I was neither terrified nor surprised, for I had previously made enquiry about all these things from people who were well acquainted with them. So after I had three times made obeisance to the emperor with my face upon the ground, I lifted up my head, and behold! the man whom just before I had seen sitting on a moderately elevated seat had now changed his raiment and was sitting on the level of the ceiling. How it was done I could not imagine unless perhaps he was lifted up by some such device as we use for raising the timbers of a wine press. On that occasion he did not address me personally, since even if he had wished to do so the wide distance between us would have rendered conversation unseemly, but by the intermediary of a secretary he enquired about Berengar's doings and asked about his health. I made a fitting reply and then, at the nod from the interpreter, left his presence and returned to my lodging."

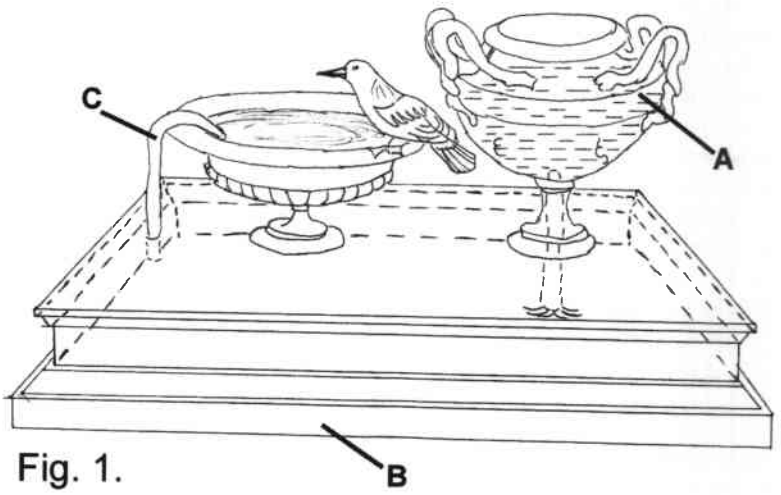


Fig. 1.

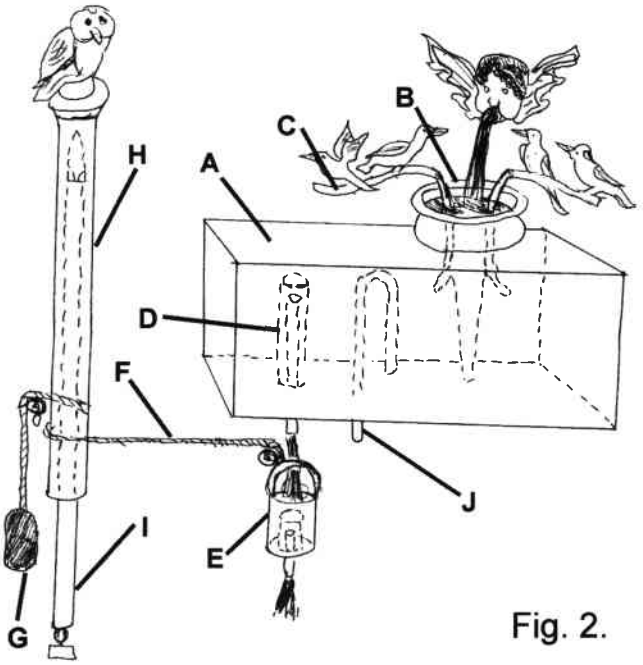


Fig. 2.

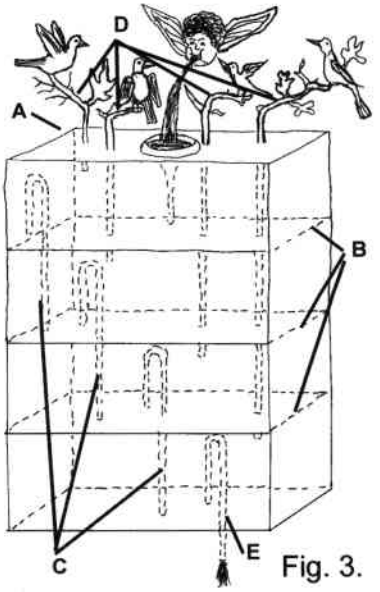


Fig. 3.

Luidprand of Cremona, Wright, A. F. (Trans), The Works of Luidprand of Cremona, (London, 1930), p. 207.

What Liudprand saw may not have been as wondrous as what he recorded, as he did after all live in a different age. When looking at automata of the Middle Ages as described in contemporary documents, Merriam Sherwood believes we should look at it as another world.

..don't tinker unless you are sure you know what the consequences are...

"I am inviting you for a few moments to forget the terrors of our world where mechanical monsters hover, and to enter a land of laughter where machines are playthings, where the march of time is marked, not by a greybeard shouldering a scythe, but by quaint puppet figures that dance away the hours, where golden birds sing and brazen lions supply a never-ending flow of wine for merrymakers, where invisible mechanisms shower the unsuspecting guest with flour or soot or water: the world of automata, "engines d'esbattement", of the Middle Ages."

Merriam Sherwood, 'Magic and Mechanics in Medieval Fiction', Studies in Philogy, Volume: 44, Number: 4, (1947), p. 567.

Now this is in one sense quite true, and yet also false. There was a different set of criteria in Luidprand's time, and what marvelled him would probably not mystify us. The fictional element picked up on by Sherwood, can be seen in Antapodosis. There were probably not enough birds to fill the tree, the roar of the lion's was probably not terrifying, and the whole story is most likely to be exaggerated. However, even when one allows for this there still remains the fact that Luidprand must have seen something. What I want to show in this short article is that he could have seen singing birds at Constantinople, along with automata, although not to the complexity we are used to today.

What Liudprand witnessed has been debated over by historians for many years. In the academic books that I have consulted, there is a scepticism that these automata could have ever existed. This view seems to be based upon the judgement that the Byzantine World did not have the technical capacity to construct such complex automata. This opinion I personally think is wrong, and a product of isolated specialism in one's own field. For when one looks in Hellenistic Egypt at the works of Heron of Alexander, Ctesibus, and Philo the Byzantine you can see that there was sophisticated technology over a thousand years before Luidprand set off for Constantinople. There is no reason to doubt that this knowledge survived, indeed it must have been used for it merely to have been preserved.

Our understanding of the workings of these earlier singing birds comes primarily for existing contemporary texts. These are mainly the technical documents by the major ancient mechanicans, Philo (c.260-180 BC), Ctesibius and Heron, also known as Hero (c. 1st C. BC). What makes gives these manuscripts some credibility of the knowledge available at the time is their technical focus, and later reconstructions have proven the described designs' feasibility. All of these birds worked through the basic principle of induction, by forcing air through a pipe usually with introduction of water. Heron describes a bird sitting on a vase (fig. 1.) that sang, and it illustrates this well. The water in the vessel on the right (a) flows into the air tight base (b), and as it does so the air is pushed up the tube which leads to the vessel on the left (c). By placing the mouth of the pipe next to the water the sound of a bird is made as the air is forced through the narrow gap, and to make the illusion work a model bird was perched on the vase. This basic principle was applied to many different applications, and by adjusting the length and diameter of the pipe the pitch could be changed. By introducing a whistle a stronger more melodious sound could be made. If this was submerged in water then you get a realistic bird call.

However the existence of this and other automata outside the sketchbook was unknown, because we have no concrete evidence. These ideas could have been the ancient equivalent of Leonardo de Vinci's submarine or aircraft, just purely in the imagination of the writer. However it is now almost certain that automata of this type did exist, and this has been recently confirmed by the identification of a preserved fresco found at the Via dei Soprastanti in Roman Pompeii as representing Heron's basic automata (Fig. 1.).

Heron took his ideas to even larger lengths, building an automaton which could give a variety of bird songs, movement and even a basic storyline, and there is no reason to doubt that these also existed. In "Birds made to sing, and be silent alternately by flowing Water" (Fig. 2), there are a number of birds, as well as an owl. Because of the mechanism the birds sing, the owl turns to them and they stop singing.

The water constantly flows into the air tight base (a) through a funnel (b). From here there are more pipes which then make the sound (c), as well as support model birds. As soon as the water is siphoned off through siphon (d), it collects in a can (e). This is connected by a pulled rope (f), on the other end of which is a weight (g). The cord is wrapped around a lose tube (h), which fits over a secure post (i), and has a model owl on top. This means that once the tank begins to empty into the can, and siphon off also at siphon (j), the owl faces the birds as they become silent. As the can empties, the weight returns the owl, and the tank starts to fill again. This is typical of one of Heron's cyclic automaton.

If layers with siphons were then introduced, it was possible for birds to maintain song for long periods of time. "Notes produced from several Birds in succession, by a Stream of Water" (Fig. 3) has a base (a) with several internal partitions (b), connected by a series of siphons (c). Each level has a bird connected through a pipe, which sounds (d). The exit siphon (e), means that there is near constant bird song from the birds.

Most of these hydraulic automata do not truly deserve the title, as they do not in general move. They are mostly simple mechanical music, however some pieces stands out. Philo the Byzantine designed an automaton with a bird that was silent (Fig. 4.). What was unusual was that the bird opened its wings, a rarity in Hellenistic works. It consisted of a hollow tree (a) supported on a vase with a perforated lid (b). A hollow rod (c) then runs through this, and is connected at one end to a float (d), the other to the mother bird (e). There is a stationary rod (f) attached to the bird's wings, and soldered at the other end to the bottom of the vessel. So when water is poured in, the snake (g) begins to rise as its float (h) does, and then the mother's body lifts, forcing the wings to open, as if in fright. To get the sequence right, float (d) never touches the vessel bottom, because of its wings (i), which cause a delay in movement.

In one piece by Heron there was movement of the bird as well as its sound, which relied on hydraulics and good old elbow grease (Fig. 5). The base (a) has an axis across it (b). Attached to this axis is the turning handle (c) which drives the automaton. Also attached to the axis are a geared wheel (d) and a pulley (e). Attached to the pulley is a cord (f), on the other end of which there is an inverted bowl (g) with a pipe projecting (h). In the pipe their must be a bird warbler, and underneath the bowl a vessel of water (i). From the top of the base there is suspended another freely revolving axis (j), on top of which is a bird model, at the other end a geared wheel (k) engaging the other gear. When the handle is turned, the geared wheel revolves and the bird moves from side to side. Also the pulley raises the bowl, but when the handle is let go, the weight of the bowl will cause it to drop, forcing out air by explosion and making the sound of a bird.

These advanced ideas were spread through the publication of the great mechanician's texts, and later technicians love of them. The basic principles of Heron were used by the great Renaissance grotto builder, Salomon de Caus (1578-1626), and he actually built a bird to Heron's exact plans. To Caus, Heron was virtually the farther of automata. What these earlier pieces show is the technology and skill available around before the tenth-century to build automata, but also that there was a lot of thought been put into trying to make life like mechanical birds. The point of discussing the Hellenistic authors is to show intent to achieve what Liudprand saw, and that they had made comparatively great advances towards it.

Not only is there the mechanical capacity of the Byzantines to build automata, but there is other documentary evidence. The story given by Luidprand is borne out by other references to automata at the Byzantine Court. The first part of De Ceremoniis describes the reception a visitor would receive in the Great Triclinium of the Magnaura in Byzantium. There are three automata mentioned in this court text, singing birds, roaring lions and moving beasts. Unfortunately nothing is said about

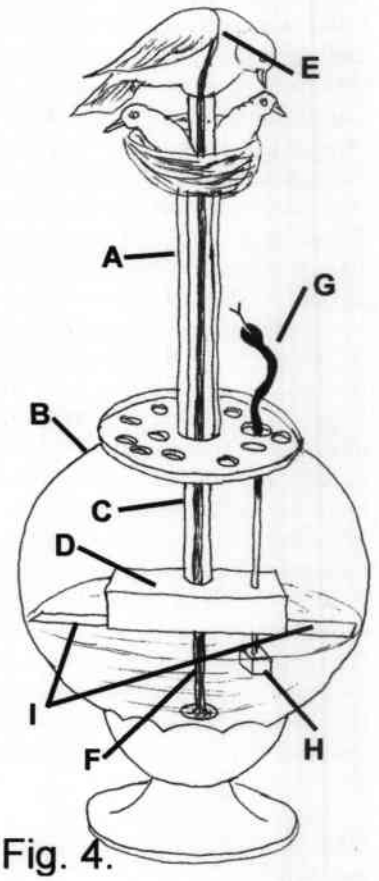


Fig. 4.

What these earlier pieces show is the technology and skill available around before the tenth-century to build automata,...

the mechanism of any of these items, and we can only debate over their workings. What this earlier text does is confirm a tradition of automata in Byzantium, and that the concept of singing birds. Their purpose was purely to give a 'wow' factor. There is one thing that makes the singing birds of Byzantium different. To us a singing bird should either be in a guilt cage, or in a tree, yet outside of Constantinople the birds were on baths. What the Byzantine's did was to graft the singing bird straight from Hellenistic invention and stick it on a new stand, the tree.

Outside of Constantinople there are few references to singing birds being on trees, and to my limited knowledge I only know of two. One in tenth-century Baghdad mentioned in 917/18 by Kh_tib when visiting the palace of Caliph al-Muqtadir in Baghdad, talks about a silver tree with multiple birds. The other being that housed at the Mongol Court at Kambalu, and described both by Rubruck and Marco Polo. These references are generally after the first singing bird on a tree was seen at Byzantium.

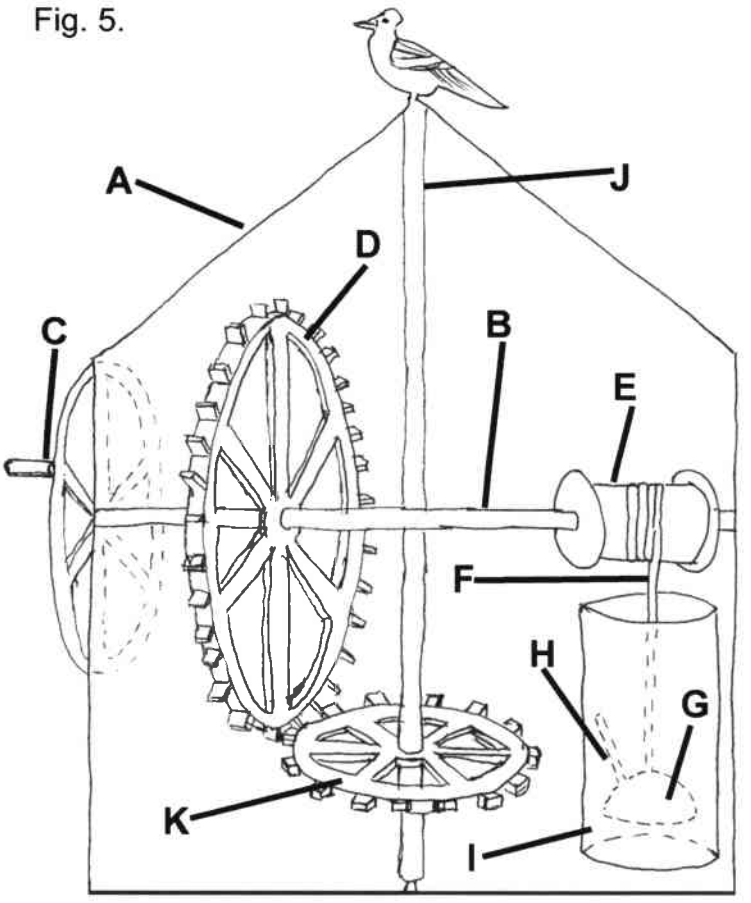
There was in the ninth and tenth centuries a major cultural exchange taking place, between the Byzantine and Hellenistic cultures. For automata, there was an impact in Constantinople made by the works of Heron, through the work of a namesake, known as either Heron the Younger, or Heron the Byzantine, in circa 938. Heron the Byzantine is suspected of being the producer of a number of fine pieces. Yet some historians have pushed the automata of Byzantium back further in history based on documentary evidence. In the reign of Emperor Theophilus (829-842), a golden tree with singing birds was recorded by Georgius Monachus. This automaton was in the belief A. Grabar and Feldhaus, imported for Theophilus from Baghdad. The fate of these singing birds according to the tenth-century Continuator of Theophanes, is that Michael III (842-867) melted down all the court automata to pay the troops during a financial crisis.

I think that after that I was too abashed to continue the correspondence.

However Luidprand wrote that there were singing birds, and other automata in the Magnura Palace over a century after Michael III came to power. Gerald Brett thinks that these new pieces were commissioned by the Emperor Constantine VII, and therefore quite new when the deacon from Pavia arrived. Yet we will never know who commissioned the automata, and it is even more highly unlikely that we will ever know how the Byzantine automata worked. For it seems that only here in the West was there a general thirst to admire the complexity of their mechanisms, perhaps showing the different views of a mystic East and a practical West. Yet the descriptions of Europeans seem to focus upon pneumatic mechanisms and an obsession with bellows. By the twelfth-century singing birds were usually constructed or thought to be constructed along the lines of Lamprecht's design, with a whole host of pipes and reeds. Now this presents a very important question, who switched from compression by water to pressure by air? Was it here in the West, the Abbasids of the East, or at the meeting point of the two cultures in Byzantium?

Historians have generally favoured the West as the most likely to have switched to air. However the evidence used to support their argument, that the mechanisms of the east relied on water is flawed. As their descriptions could be easily be describing pneumatic as well as hydraulic mechanisms, and most designs could easily be converted. As Heron mentions water in his documents, it seems unlikely that he had explored the possibility of using air, yet he had explored with steam. The other Hellenistic writers refer to the need to have running water in the vicinity, and this has generally been interpreted that they did not develop the pneumatic mechanism. However it can be argued that the bellows may have been invented by Philo, in which case it is indeed possible that the bird may have been converted in the east. For in his Pneumatics Philo outlines seventy-five mechanisms driven by hot air or steam. However the concept of using bellows for automata seems quite foreign to him, Ctesibius may have constructed a compressed air missile launcher, but all automata were hydraulic. The reason why I have previously considered the stand

Fig. 5.



for the bird, is because I feel it has a bearing on the mechanism. A tree would lend itself to air as the motive power, whereas standing a bird on, or near, a bowl of water would mean the water was there for something.

The descriptions we have of the singing birds when mentioned in connection with the tree do not usually mention close proximity of any water vessel. Meaning that switching to air removed the necessity to have running water, and a vessel nearby, allowing newer more complex designs. Also running water was not readily available at the Magnura Palace complex in Constantinople and major building projects were embarked upon to get minimal amounts of water there. Water was not at any rate mentioned in any of the known texts that have been scrutinised, and suggests that in Byzantium at least the singing birds may have been pneumatic rather than hydraulic.

Gerald Brett in his informative article about the automata of Byzantium, upon which a lot of my information is based, also believes that if the lions were positioned in the manner outlined by Liudprand, then they must have been driven by air. Water would have been impractical to supply the pressure that was required for such a complicated performance. That is not to be taken as an insult to hydraulic automata, as Heron achieved most impressive performances with his. Yet hydraulic automata by their very nature were compact in scale. As De Ceremoniis mentions the birds as being both on trees, and one on the throne, the power would need to be pneumatic to achieve such a distance from one single mechanism, and it must have been so. Liudprand writes in awe that so much was done in unison, therefore all of the automata would have been best served from once single computer. Brett believes, rightly, that whoever decided to put the singing bird upon the branch of a tree therefore changed the mechanism. All of the available evidence would seem to point to Byzantium as being the home of the pneumatic singing bird because it is the place where the bird was separated from the vase of water.

What about the other automata thought to have existed at the court? The beasts that are hinted at in the De Ceremoniis are not referred to in any foreign sources, and when later writers such as the Continuator mention the throne of Theophilus, they describe griffons, but do not mention any movement. There is so little evidence for the beasts, and so much is the disagreement in the sources we do have, that no conclusions can be drawn. Yet there is a lot of evidence for singing birds in the Byzantine Court. Historians have continually doubted its existence, and recently James Trilling has put Luidprand on a par with Hans Christen Anderson for constructing what he sees as a fairy story. Yet unlike the claim by Pindar that the Colossus of Rhodes was once a great automaton, there are a number of sources with which it is possible to cross-reference Luidprand's story. These singing birds have received attention from a number of Byzantine scholars, who have called the automata the 'Nightingale', after the Anderson fable, quite wrongly. This traditional interpretation has for a long time stood quite firm, but if you look at the technology that went before then it is quite possible that Luidparand did see a singing bird in the Byzantine Court, yet not to the scale we are used to.

The Magnura Palace was destroyed by crusaders in 1204 during the Fourth Crusade, and now only part of the Boukoleon Wing remains standing. By the time the Palace was levelled it is doubtful that the automata were still in residence, and in a manuscript by a French crusader, Robert de Clari, there is reference to copper articulated static figures located within the Constantinople Hippodrome which he said were believed to once have magically moved in the Magnura Palace. We do not know the fate of the Byzantine automata, but we can be certain that they do not exist now.

There is, I believe, enough evidence to state that the Byzantine Court at Constantinople did indeed have automata, and that Luidprand's story can be verified. Because of the huge time gap between now and then, over a millennium, we have no concrete evidence of their existence. All we have is the words of contemporarys, such as Luidprand. Yet the literature that has survived serves as a window for us to be able to look and see the magnificent world of the Byzantine Court, and its importance in the creation of modern automata. Therefore we can look upon Byzantium as the both the home of the modern singing bird, and having a culture far advanced than is often thought. Looking back at this article it probably would have been better if I had told a rude joke.

(When I refer to hydraulic movements I mean any that is powered by water, even though the mechanism relies on pneumatics. What I am interested in is the origin of the primary energy source. Likewise pneumatic is used to describe a mechanism driven slowly through air, most importantly the use of bellows. I hope that this removes any confusion, but it probably will not.) ■

...it is quite possible that Luidparand did see a singing bird in the Byzantine Court, yet not to the scale we are used to.

Make Do & Mend

In the workshop

by Paul Bellamy

Quite a few years ago, as a budding engineer complete with paper qualifications and not much practical experience, I started work with GEC as a post-graduate apprentice. For two years, the master craftsman to whom each of us was allocated ensured that we were put in our place. "So, you think you know it all then with all those fancy bits of paper?" They took delight in showing how little we knew. Silence, deference and a willingness to contribute to their production bonus, for which we got not a penny, was the way to their hearts and knowledge.

Silence, deference and a willingness to contribute to their production bonus, for which we got not a penny, was the way to their hearts and knowledge.

Thus two years later I was expected to earn some real money for the Firm and found myself commissioning, servicing and maintaining all types of steam turbines in all sorts of strange places. Virtually living out of a suitcase permanently equipped with razor, overalls and a change of togs, I found myself on a Norwegian oil tanker, the Samuel Uglestadt, in the port of Palermo.

Samuel, poor thing, was minus one serviceable auxiliary steam turbine. A telex message, those things that took hours to scan and transmit across unreliable international telephone links, eventually reached its destination. The reply was encouraging! "Yes, we have a full set of drawings, full set of spare parts as per the maintenance equipment schedule, etc., etc., etc."

On arrival, monolinguistic Norwegians and Sicilians, no interpreter, no drawings and no spares! It was a case of 'make do and mend'.

Thanks to those skilled chaps back at 'the shop', I now knew how to 'lap', 'fit', 'shim', 'align', 'dowel' and 'pin'. I also knew what a packet of holes was and a bastard file. All useful things long ago.

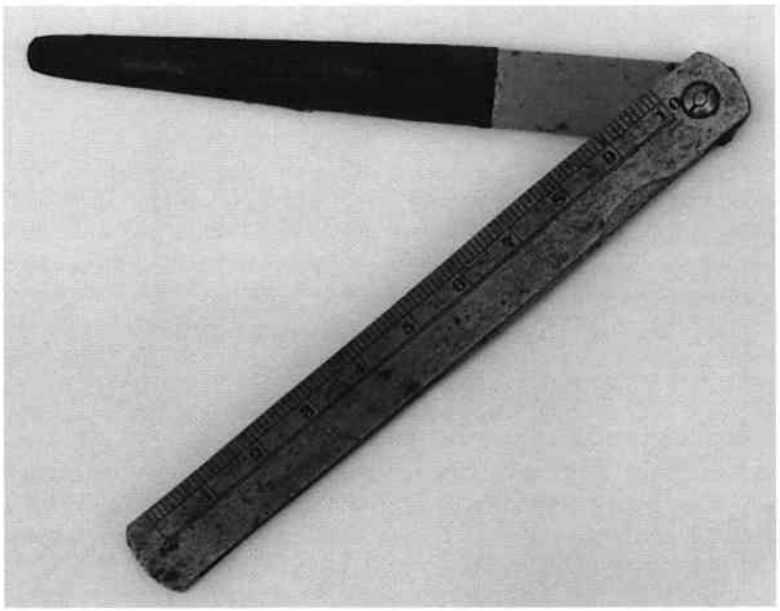


Fig. 1. Feeler gauge file used to dress the worm wheel.

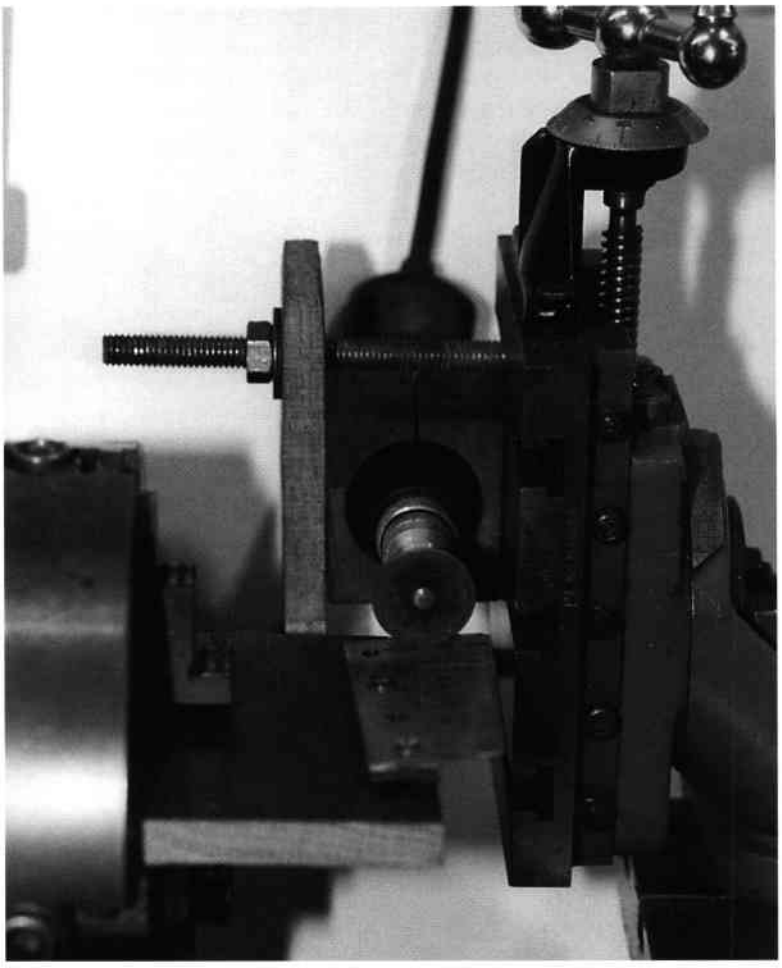


Fig. 2. Comb set up for grinding the root slot for new tooth.

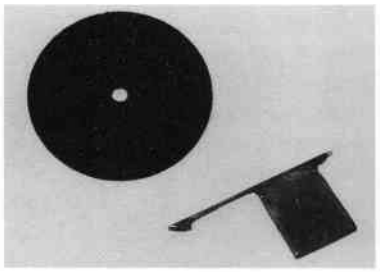


Fig. 3. Tooth cut from scrap comb, showing lead weight attached. Root yet to be profiled.

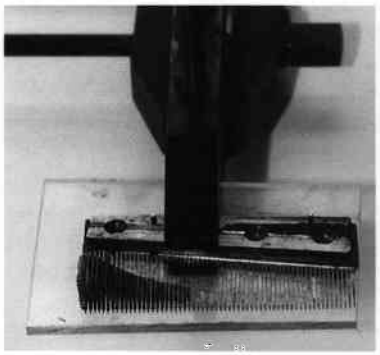


Fig. 4. Comb clamped face down on piece of Perspex. This allows the mating surfaces to be viewed from below whilst gluing.

The turbine governor needed shimming. Now shim stock in Palermo was as rare as a fridge in the artic but a tin can of disgusting Norwegian oily fish, removed from the galley pantry, with contents back in the harbour and the tin carefully beaten flat, produced that bit of shim. For Samuel, the problem was soon solved with Turbo-generator back in service, galley lights back on, and no one missing that tin can of dreadful fish.

Of course, little did I know at the time that this big brother of a governor had the same basic principles as its smaller cousin sitting in a musical box. Worn worms, sloppy bearings, damaged gear teeth are just a matter of scale.

The theme of make do and mend is often the last resort for those who have smaller pockets and limited equipment in the home workshop. Those old craft skills, often made obsolete by our modern high-tech world, applied simple tools and methods, which, through careful hands and sufficient time, could produce wonderful results to a high standard. But modern materials also have their place in this make-do-and-mend environment. At Ted Brown's old school and his workshop days, equally noted for its adjacent hostelry, pub lunch and draft beer, one of those sessions was hosted by Anthony Bulleid on the subject of comb repairs. A learned dissertation on the speed of sound transmission through modern glues led to other ways of replacing missing teeth. Spurred on by these revelations, my attention turned to the broken snuffbox, bought in a moment of foolish over-optimism and now lying motionless and neglected on the shelf, awaiting the 'well man' clinic. This little composition-cased box with half a ton of solid brass bedplate had been acted upon by gravity. One lost bass tooth, wrecked governor, broken case and what else? Oh yes, that missing piece of moulded bottom cover plate.

The governors of these boxes are tiny. They have one extra gear in the train that causes the fly and its worm to thrust downwards. This one had a 'bay-leaf' worm wheel gear that had been replaced from another movement and was slightly off centre. The dowel was missing. Only a screw held it in place. Thus it was another disaster waiting to happen. Had this little gear moved out of engagement the entire power of the spring would have been released to cause a 'run', the worst feared disaster for the collector. The cylinder rotates at breakneck speed, almost sufficient to launch it into space. Teeth fly, accompanied by pins, tips dampers and whatever else gets in the way of this release of energy.

This governor actually ran but did not self-start. Not much use when the works lie under the sealed 'tortoise shell' internal cover. (OK, it is really turtle shell).

Before attempting such work, do read the established tomes such as H.A.V.Bulleid's 'Cylinder Musical Box Design and Repair', particularly the section on governors, and Arthur W J G Ord-Hume's Restoring Musical Boxes and Musical Clocks, or any of the many other excellent works available. Also, speak to other members who have practical experience and will give you good advice. Remember that all experts were novices at one time and members will share their experience and knowledge.

Now shim stock in Palermo was as rare as a fridge in the artic...

The 'bay leaf' worm was easy to align with the axis of its worm shaft by clamping the shaft in the lathe's chuck and using a tail-stock mounted chuck with a piece of brass turned and drilled to butt up against the worm wheel. Using a digital vernier calliper, (a most useful tool that reads in imperial or metric values and can be set to zero each time if required), the tail stock wheel was turned to move the worm along its shaft just a 'few thou'. After a few more incremental adjustments the new alignment was achieved.

The worm wheel and shaft was then refitted and, after careful adjustment to get the governor to

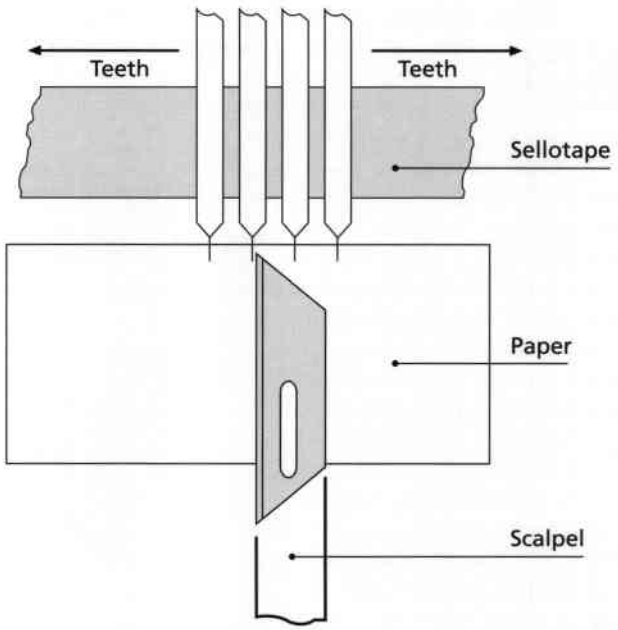


Fig. 5. Paper template used to set the tip distance of the replaced tooth.

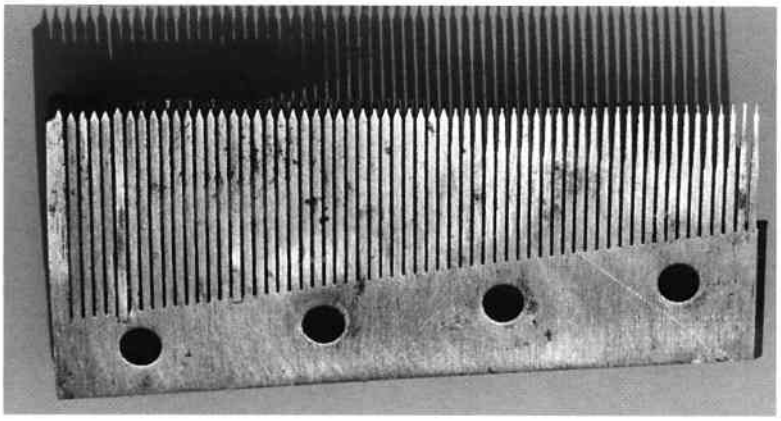


Fig. 6. Tooth glued in place.

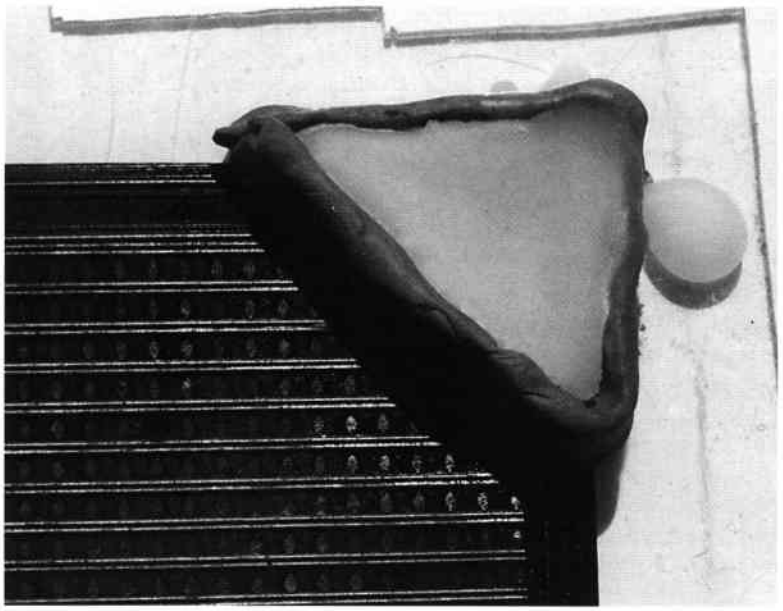


Fig. 7. The candle wax mould.

run under light finger pressure, the missing dowel pin replaced.

Alas, the governor still performed erratically, failing to self- start under light spring load although it functioned when the spring was wound up. Thus we had a friction problem. I began to wonder what idiot bought this thing in the first place. Of course, the last idiot was me but someone else had failed and botched a repair sufficiently enough to pass muster to get a sale. Buyer beware! In that moment of frustration the words of one of those craftsmen came to mind: "If you don't make mistakes, you don't make anything."

The worm wheel has 16 teeth. Using a magnifying glass, the tips were seen to be very worn down. These should have line contact with the worm (or endless, using its other name). I do not have a clock-makers lathe, only an old, well used, Myford. The periphery of the wheel was true to its shaft and there was no wobble, so I decided to 'hand-dress' the tooth tip profile, something I had done on many a large gear but never on one so small as this. Again, this is a question of scale. The dressing tool was a suitably stiff feeler-gauge onto which a piece of the finest grade 'flower' paper was Superglued. (Fig. 1). The file was then drawn lightly across the face of each tooth in turn. Do this at the same angle as the original teeth. They are not necessarily parallel with its shaft but may be at an angle that gives line contact with the worm. Both profiles should work but it is best to keep to the original. Also the tip was too broad due to wear. These early governor worms tend to be flat on one side and chamfered on the other, hence the term 'bay leaf', and so the chamfered side is the one to dress. After a few tries, the governor became its former self.

The repair of the comb's missing tooth should ideally have been a conventional soldered one. However, two nearby bass teeth were also soldered repairs. These were probably done at the time of manufacture as evidenced by grinding marks across the whole length of the comb on the underside. My skills are too limited to attempt a repair of this type. So, remembering the workshop practice at 'the Old School' a glue repair was attempted. Unfortunately, the comb was so hard that it was nigh on impossible to cut through its hardened 'skin' even with the best of miniature files. My best little 'Swiss' file now lies toothless in the drawer. Fig. 2 shows a solution using an electric mini-drill and steel-cutting disc, mounted in a wooden block on the vertical slide of the lathe. This arrangement gives accurate positioning in all three planes. The 4-jaw chuck makes an excellent clamp for a wooden batten to which the comb can be attached by screws. Remember to remove the plug supplying power to the lathe motor! Lock the chuck to set the comb horizontally. (A dividing attachment can be used or simply clamp one of the drive gears). Position the cutting disc by adjusting the vertical slide, switch on and apply a very light cut by means of, say, the lead screw hand wheel. Use some coolant sprayed on by hand as required. The profile of the root will be that of the cutting disc.

Fig. 8. The reverse side of the cover plate. When the Araldite-powder mix is hard, shape flat and remove shiny surface.

I try to replace teeth with those salvaged from discarded combs, as these do not need to be hardened and tempered. A new tooth can be made from suitable stock such as gauge plate. Again, look to those books for further information. The mini-grinder can be used to cut a tooth out of a discarded comb but include about 3/8 inch of root material, this being at the thickest part of the comb. Most teeth tend to have the same dimensions of width and thickness. If not, use that min-grinder again. The length should be left slightly oversize and reduced after the tooth has been fitted. Remove the grinder's disc and use it as a profile gauge for grinding the root profile of the replacement tooth. Standard 'engineer's blue' is a must for bedding new tooth root into the slot.

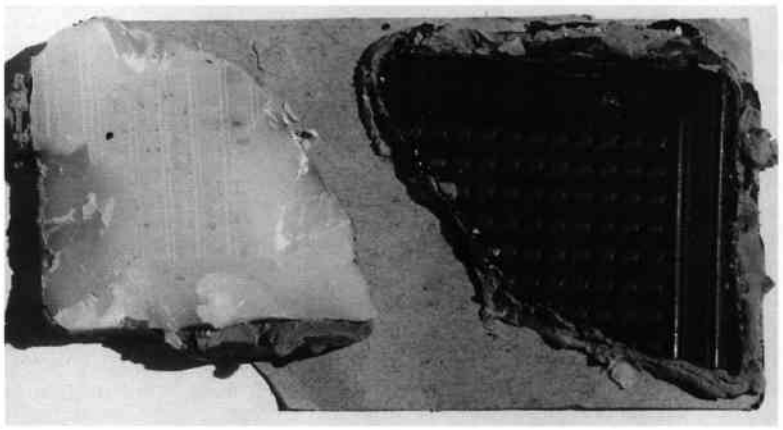


Fig. 9 The restored cover, awaiting keyhole ferrule.

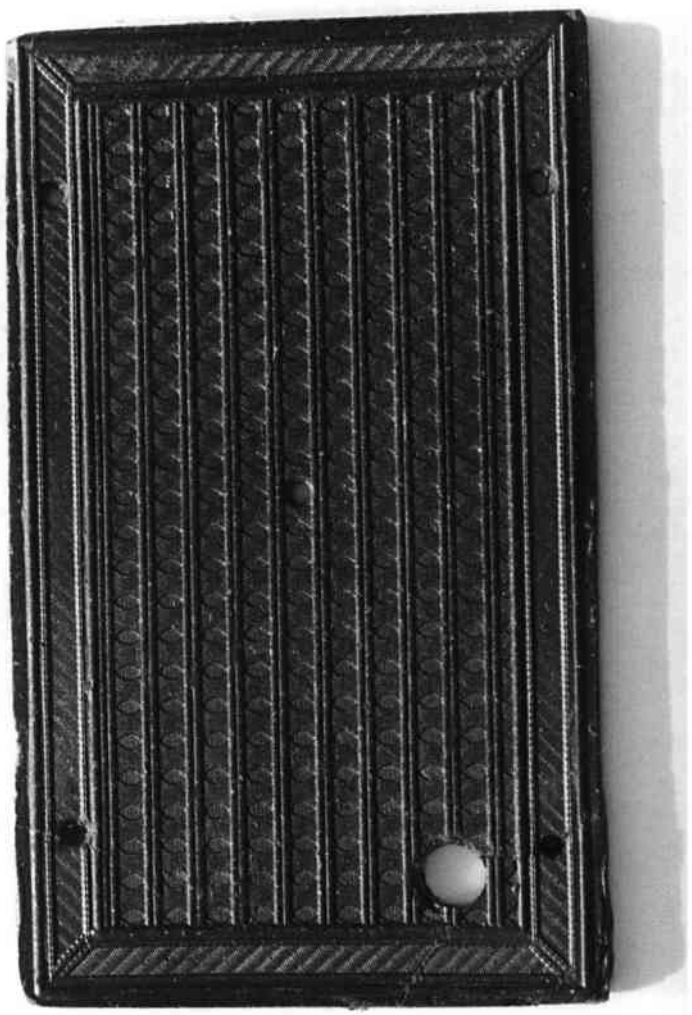


Fig .10.

For a lead weighted tooth, squeeze a piece of lead between two pieces of, say, tool steel in the vice. Measure the gap between the tool steel (that vernier calliper again). Trim to a size slightly longer than those on adjacent teeth and solder or glue it in position. The tip will need to be narrowed at the tip. Again, use that mini-grinder and vernier calliper so that you work from both sides alternately until the tip is central to its tooth and its width is the same as its siblings. Fig. 3 shows the tooth with lead attached before final profiling of its root. Glue the tooth into position (Araldite Super-metal or other high-bond commercial metal adhesive). Do this by clamping the comb topside down onto a flat surface such as a piece of tool steel or glass. Push the tooth into position with a smidgen of the adhesive and ensure it lies equidistant between adjacent teeth, (Fig. 4). Finish to length as for a normal tooth replacement and tune. (Refer to those books again). I find the mini-grinder is ideal for tuning a tooth but more about this perhaps another time.

Use Sellotape or similar to hold the tooth in position. It is surprising how a tooth can move as the glue hardens, so do not take risks. A piece of paper, marked as a template for the tips of the comb, can be used to ensure the replacement tooth tip is at the same incremental distance as all the others. (Fig.5). Fig 6 shows the tooth in its final position.

Now for that case. Arthur Cunliffe, at a long ago Meet, demonstrated how he used an Araldite and black powder paint mix to repair a composition box. Neat Araldite needs to be applied first to cleaned surfaces, then clamped or supported. Then scrape away the exposed white araldite, a scalpel or dental probe works wonders, and apply the Araldite-black powder mix. Ensure to leave the clamps or supports in place, otherwise the mixture will 'run'. The powder tends to reduce the strength of adhesion although it makes superb filler. The finish is difficult to tell from that of composition.

Lastly, the broken base cove-plate with missing corner. These covers are usually composition material formed in a mould with

engine-turned patterning. The detail is extremely fine. As a child, I remember using candle wax to cast simple objects, such as leaves, in plaster of Paris. Happy days! They say one learns through play. So, playtime again. The cover was cleaned with toothbrush and methylated spirit, then polished with a silicone-based polish and finally sprayed with a sprinkling of WD40, leaving no surplus fluid. A Playdoh bund about 1/2 inch high was then built around a section almost identical to the missing bit at the diagonally opposite corner. Candle wax was then heated with a cigarette lighter flame and allowed to flow into the centre of the mould until it flowed out towards the edges and then filled to the brim. Leave for at least twenty minutes, as the core of the wax remains plastic for a long time. Prise the bund gently away and prise up the wax block around the edges. It should lift clear and leave a perfect impression, (Fig. 7). If there are any air bubbles, have another go.

Form another bund with that Playdoh. Cut it down with a scalpel to just deeper than the thickness of the thin cover plate. Use the Araldite-black powder mix and try not to create air bubbles, (1/3 powder to Araldite seems to work well). Pour gently into centre of mould. Wet a finger and spread out to a level surface. Then gently press a piece of stiff shiny cardboard onto the contents. Leave for 24 hours. Peel off the cardboard and Playdoh. Then gently prise away the wax mould.

Carefully trim and file the edges until they match the profile of the missing section. I find those sintered files or rasps obtainable in tool shops and big stores such as B&Q are very good to do the basic trimming. If they clog, a wire brush will free up the surface. They remain sharp and produce a straight edge. You may also have to 'dress' the edges of the break. Take a paper rubbing or the break and use it as a guide to trimming the replacement. Just as in marquetry work, it is possible to get one piece to exactly align with its host. In my case, the engine-turned moulding was slightly asymmetrical and I had to take two mouldings and match the pieces in two stages. Thus the L-shaped corner border was shaped first and then the centre panel trimmed to fit both this and the original. The coarse sintered file was also used to rub the pieces down to exact matching thickness. Neat Araldite was used at the edges of the pieces, surplus scraped away and the slight indent, left after scraping, was then filled with a little of the powder mix. The bases are very thin. Also my one was cracked, so I bonded the whole lot with Araldite onto a thin, flat piece of steel shim stock. 24 hours later, the whole was 'painted' with the Araldite-powder mix, left to harden, abraded with the sintered file, (Fig 8), and the original 5 screw hols drilled through. Finally, a new, pointed scalpel was used to trim the abutting surfaces so that the engine-turned pattern blended with its host. Fig. 9 shows the restored cover with its keyhole cut out but awaiting a brass ferrule. This can either be turned from solid or a simple cup-and-cone press turned up on the lathe. Turn a piece of brass to form a thin tube for the press. Use the vice to squeeze it into shape. Again, a possible workshop tip for he future. ■

New Music for Old Roller Organs

by Charles Moore

It's here at last, a fully computer operated roller pinning machine. At last, new music for old roller organs! Popular music from the early 1920's to 2002 can now be adapted for the 20 note Gem and Concert Roller Organs. These organettes were, and still are fascinating music making machines. Many of these machines are still available today in the antique musical instrument market.

The Gem Roller Organ was introduced by the Autophone Co. of Ithaca New York in the late 1880s. Because of its simple, durable design and low cost it became very popular. It was produced in large numbers, up to ten thousand units per year, from the late 1880s through the 1920s. The music, in the form of a pinned wooden roller, was inexpensive to mass produce and was also key to the commercial success of the organ. The Gem was sold directly by the Autophone Co. and also through distributors who applied their own labelling. It was featured in the 1902 Sears catalogue and sold for $3.25. Rollers sold for 18 cents. The basic model of the Gem can be found with names such as the "American Music Box" and the "Home Music Box". A deluxe model with an improved air supply and a larger, fancier case was sold as the "Concert Roller Organ" and the "Chautauqua Roller Organ".

This is one version of the Gem Roller Organ shown with the front cover open. The organ is vacuum operated. The reed block is mounted behind the double row of valves on the front of the organ. There are a total of 20 notes with the lower notes arranged on the top row where the valves open wider. The roller or cob as it is now commonly known, installs on a cast iron carriage and is geared to rotate as the crank is turned. As the roller rotates, a worm gear on the left end advances it to the right against return springs on each end of the carriage. The pins on the roller open the valves as the roller turns. The pins are installed along a spiral path back to the left. The roller plays nearly three times around and then a lever engages a release mechanism that pushes the roller away from the valves. This action also disengages the worm gear momentarily allowing the return springs to snap the roller back to the starting position.

The success of the Gem Roller Organ can be attributed to its simple low cost construction, and the design of the pinned roller that could be mass produced. There are two features described in the patent for the design of the roller that made mass production feasible. One is that the new Gem rollers did not require staples to sound sustained notes. Instead of staples which were used on many pinned barrels, the Gem

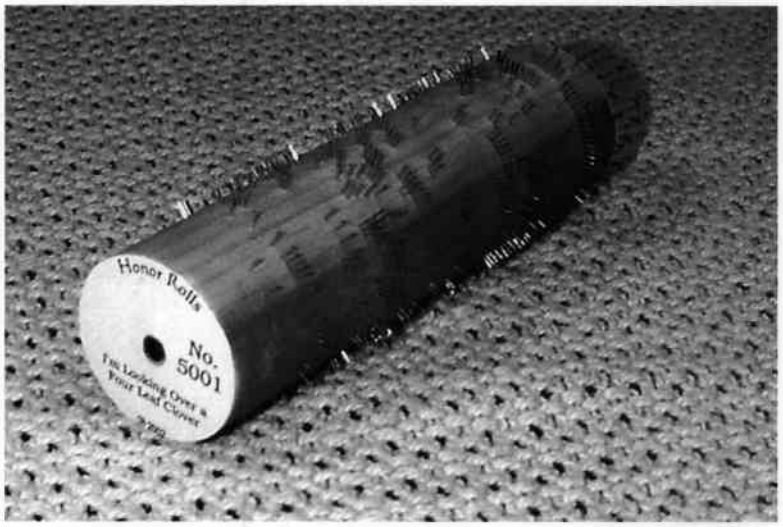


Fig. 1 A new music roller for the Gem Roller Organ.

Fig. 2. The "Home Music Box" is the basic vacuum-operated model of the Gem Roller organ with a front cover and name board added for "show." Here the front cover is shown open revealing the double row of valves.

rollers used a series of closely spaced pins to hold the valves open for sustained notes. Staples could not easily be installed by machine. The other feature was the pinning of multiple revolutions of the roller with all of the notes falling on a single spiral path. For the Gem this resulted in a roller that played in just under three revolutions with the pins for the next note down the roller starting along the same spiral path at the beginning of the third revolution. This meant that a machine could be built to install pins one at a time at predetermined points along the single spiral path.

(Source for patent information for the roller was taken from Todd Augsburger's web site, www.rollerorgans.com, www.rollerorgans.com/Roller_Organ_Patents.htm)

The original pinning machine however was anything but simple. The original invention patented by Henry B. Morris is dated May 1, 1884 (patent no. 315,052). It describes a wonderfully complex machine that replicates rollers from a pattern cylinder. The machine incorporates cams, slides, shears, transfer-blocks, levers, pawls, a counter-shaft, a lead screw, eccentrics, yokes, pitmans, spur wheels, feeder wheels and dogs. All of this machinery to orchestrate the step by step pinning of the music roller from a spool of steel wire. This first pinning machine had a pattern cylinder that was three times the diameter of the music roller, with holes for drop-in pins that determine the position of pins on the roller. The drop-in pins allowed the pattern to be changed for different tunes. At each position, where a pin was to be placed, the mechanism would feed a short length of steel wire from a spool, clipped it to length to form a pin and then drive the pin into the roller. The roller and the pattern cylinder advanced on a lead screw one tenth of an inch per revolution to form the continuous spiral path for the pins. At full speed it must have been something to see and to hear. Later there were pinning machines built that turned out multiple copies, up to twelve at a time, from one pattern. During the time that the Gem Roller Organ was manufactured, there where over 1000 different tunes pinned.

(Information on the patent for the original pinning machine taken from Kevin McElhone's "The Organette Book" published by MBSGB).

So, how do you build an automated pinning machine in the year 2002? The economic equation is very different now because the market for new cobs is limited. The new pinner must be inexpensive enough to build so that costs can be recovered over a much smaller number of units sold. Or, maybe inexpensive enough to build as a hobby. Building something like the original pinning machine would be very challenging and very costly. But that is where technology steps in to make it feasible to design and build a new automated pinning machine.

The basic idea of the pinner is the same as the original. A blank cob is rotated and advanced with a lead screw such that pins can be installed along a continuous spiral path. The lead screw, however, is about the only major part that the old and new pinning machines have in common. Where the original pinner used a complicated mechanism to sequence the cutting and installation of pins from a spool of steel wire, the new pinner uses a commercially available pneumatic tool for installing copper plated headless pins. The original pinner used a step and repeat process to copy a master pattern. The new pinner is computer controlled and uses a stepper motor and a miniature gear box to precisely position pins at any point along the spiral path. The new "master pattern" is a data file with pin positions defined for each particular tune. Technological advances have encapsulated much of the complexity in the form of standard components; the computer, stepper motor and headless pinner.

So, how do you get a new tune onto a cob? It begins with an expert arranger of mechanical music sitting at a computer adapting the music to the 20 note scale. There are just a few rules to follow in creating the music specifically for the Gem Roller Organ. First the repetition rate for a single note is limited to about five repetitions per second. Also the minimum note duration is

Fig. 3. The pins on the roller lift the valves to play the 20-note scale. The roller plays for about 40 seconds in three revolutions and then returns to the beginning.

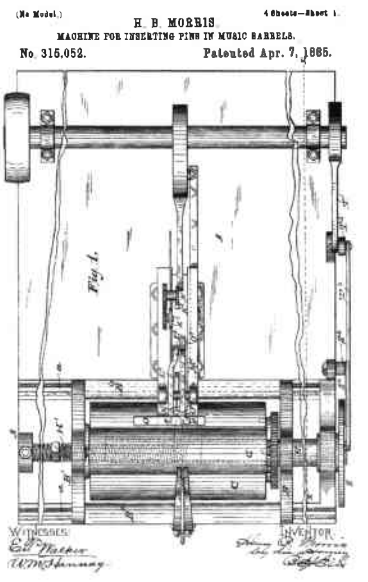


Fig. 4. Henry Morris' patent (No. 315,052) granted May 1, 1884.

about one fifth of a second or so. Finally, the playing time for the song should be about 35 to 42 seconds. Following these few rules, the music as played back on the computer will translate reasonably faithfully to the pinned roller. The completed arrangement is saved as a MIDI file. These are the mechanical steps involved but bringing the music to life is the real genius of the expert arranger.

Then the MIDI file is passed through a conversion program to create a "pin" file containing the pin positions on the roller. The starting position and duration of each note in the MIDI file are converted to a precise locations for the pins. The first pin is followed by a run of optimally spaced trailing pins to match the desired note duration. Each pin is located to within a fraction of a degree by its angular position along the continuous spiral path. There are twenty notes and three revolutions for a total of sixty revolutions so that the pins positions range from 0 to 21600 degrees.

The pin file is then read into a "control" program that operates the pinner. The stepper motor, a solenoid to fire the pneumatic pinner, and travel limit switches are all controlled over a standard parallel port. The blank cob is first installed on the pinner and moved to the standard home position. To begin the pinning process, the angle for the first pin is read from the pin file and the stepper motor is run forward to position the roller at that angle. There are 2732 steps per revolution so that the angle is matched very closely. Then, upon reaching the desired position, the roller is stopped just momentarily and the headless pinner is fired to install a pin. Then it is on to the next pin. The pinner halts every so often for the operator to reload the headless pinner but it is otherwise fully automated. Once pinning is completed, the last step is to apply labels to the ends of the new cob and to the box.

Some interesting questions have come up once this project got underway. One was can you make copies of original cobs? After giving that a little thought the answer was yes. A reader attachment was added to the pinner to allow the pin positions to be "read" into the computer. This has been tested on several original rollers. Some reproductions of original cobs that are familiar tunes, but are now hard to find, will be offered to collectors.

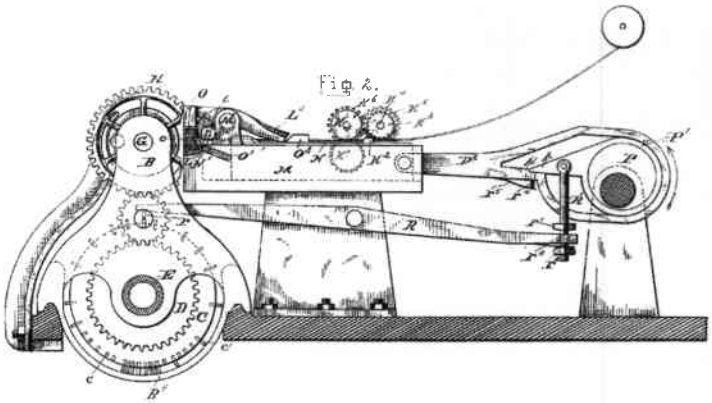


Fig. 5. A side view of Henry Morris' patent.

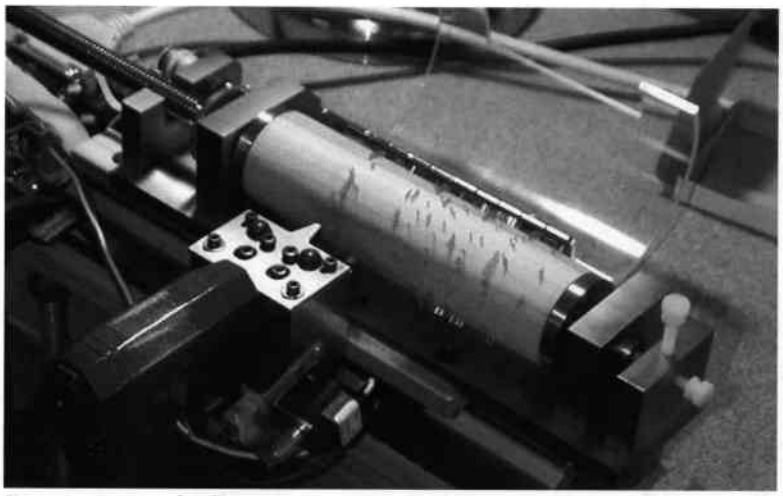


Fig. 6. A pneumatic "headless pinner" is used to install steel pins in the roller. as the blank roller is rotated, a lead screw advances the roller and mounting stage along a slide rail. This creates the one-tenth of an inch per revolution spiral path required for the pins.

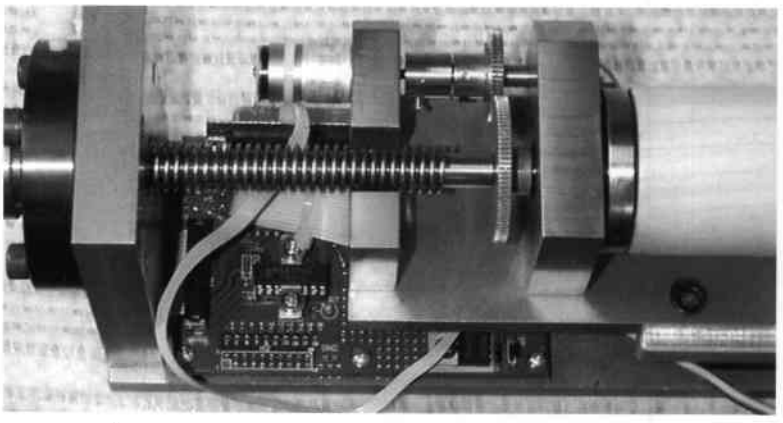


Fig. 7. A small stepper motor mounted on the roller stage is geared to the roller and the lead screw. The nut for the lead screw is adjustable to precisely locate the spiral path for the pins.

Fig. 8. The headless pinner can be fired automatically with a solenoid or triggered manually.

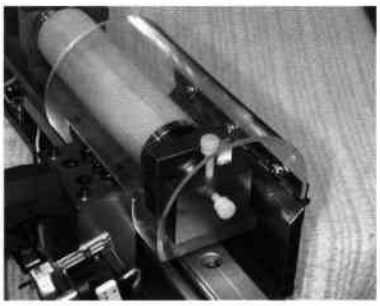


Fig. 9. A shield protects the operator from the unlikely possibility of an errant pin.

Other questions - Are you going to make the larger 32 note cobs for the Grand Roller Organ? Maybe, if the interest is there. It would be a more challenging project because the pinning machine would have to be much more accurate. And - Could you pin other types of barrels? Well, the same kind of approach could certainly be used to pin other types of barrels. That is, as long as it would work to replace the staples for sustained notes, with continuous runs of closely spaced pins.

As of August 2002, forty three new rollers are being offered for sale to collectors. Even if you consider that this is more of a hobby rather than a business, you make some decisions that test your commitment. We have purchased 1500 poplar blanks, 1000 custom boxes and 1.4 million pins. But the project can already be considered a success. We have been privileged to meet with and correspond with many people who have an active interest in preserving these historic instruments and the original music rollers. We have also been able to work with and learn from experts in the arrangement of music for mechanical music instruments. And perhaps, over time, we can collectively add a small footnote to the history of roller organ.

We would like to thank several people who have provided valuable information and assistance in getting this project underway; Todd Augsburger, Kevin McElhone, Richard Dutton, Andy Witkowsky, Barry Bierwirth and Harald Mueller. Also thanks to our arrangers, Wayne Holton, Jessie Moore and Harald Mueller. Special recognition goes to the late Carl Semon who's friendship, generosity and genius inspired us to take on the automatic pinner project in the first place. ■

Fig. 10. A laptop computer controls the automatic pinner over a standard parallel port.

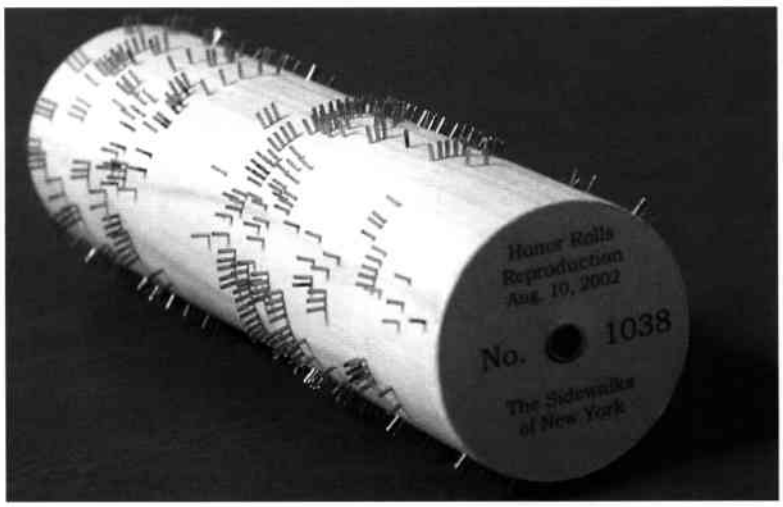


Fig. 11. A reproduction of an original roller, 1038 The Sidewalks of New York. A reader attachment on the pinner allows originals to be read into the computer. The roller is clearly labelled as a reproduction.

Fig. 12. Unlike the original rollers the new rollers are supplied with a box for convenient storage and stacking.

This article first appeared in Carousel Organ, the Journal of COAA - the Carousel Organ Association of America, and is reproduced by kind permission of the authors and COAA Editor Ron Bopp. Kevin McElhone is coordinating sales of the new cobs for UK and Europe. Cost for UK is £25 per cob including delivery. Phone for details and costs in other currencies - 01536 523988.

Preserve Your Audio

Part 2 - Keeping those treasured sounds

by Tony King

Part 1 of this article was about creating CDs from cassettes or LPs, and this part is about giving them a professional look and perhaps making them sound better. These days, most things are possible! I should mention again that although I shall only be describing the Nero program (because that's the one I have), other programs have similar facilities and I hope you will be encouraged to explore your particular program.

Get the Professional Look

To look good on your shelves, your CD cases will need proper inserts - the Nero program suite includes a Cover Designer which makes it (fairly) easy to create these. When you start Cover Designer, the first window offers you a choice of CD case sizes (standard, maxi, slim pack etc.). Select (by 'clicking', as usual) the type of case you are using, 'click' the 'audio' option at the bottom, and then 'click' OK. This opens the 'preparation' window shown in the picture, which has four tabs at the bottom, one for each part of the insert - Booklet Front, Booklet Rear, Inlay and Disc. Although 'Booklet' in this context is the thing that slips inside the front cover of the case, you can't directly generate a 'booklet' (not with Nero, anyway) - you have to settle for a front and rear and stick them together!

Firstly, 'click' the 'Booklet Front' tab. The stuff at the top of its window is very like a 'Word' toolbar, but there is also a toolbar on the left which has several 'text' and 'picture' facilities - however, we'll just use a couple of them. Throughout the following procedure you should 'save' your efforts regularly so that you don't have to start all over again if anything goes wrong.

For a simple, elegant insert of, say, a coloured script title on a white ground, 'click' on the letter 'A' on the left toolbar (which stands for 'artistic text'), point to somewhere in the part representing the insert and 'click' again. Now 'click' on the down-arrow next to the font name at the top of the window, select the font you want to use, and choose a font size - 30 pt. will do but it's not important for reasons which will become obvious. You can now type your title, but it can only be one line at a time - pressing 'return' terminates the process, and will put eight little black squares round your title, as in the picture. It's a good idea at this stage to 'click' on the arrow at the top of the left toolbar to avoid unexpected happenings! If you now point at one of the corner black squares (if they have disappeared, 'click' on a letter of your title and they will reappear), the pointer will change to a double-headed diagonal arrow, and if you press and hold the mouse button you can change the size of the title by moving your mouse - this is why the choice of font size doesn't matter! By doing the same on any of the central 'side' squares you can elongate or squash the title, and if you 'click and hold' on one of the letters you can slide the title to any part of the area. So, for a multi-line title just repeat the above, with a different font if you like. You can see from the picture what the result might look like. You can also see that not only have I a strange font size of 46.4 - this is because I have already done a bit of box stretching - but that I can't spell 'nachtmusik'!

In my picture the letters are hollow - if you 'right click' on any letter and click 'properties' on the menu that appears, you can select any fill-in colour by choosing the 'brush' tab on the next window. If you select the 'pen' tab you can also change the colour of the outline.

Another possibility is to write your title over a picture - it's easier if you choose the picture before you write the title. In the left-hand toolbar, 'click' on the camera icon towards the bottom, and you will be presented with a window in which you can select and open a file of pictures - choose a suitable picture and then proceed as above for the title(s).

There are other options on the left toolbar which you can amuse yourself by playing with - the diagonal line, the square and the ellipse enable you to draw your own basic pictures, and squares, ellipses and any closed shape can be filled in with colour.

To create the 'booklet rear', select its tab at the bottom. As this will probably consist of a list of titles, using the method above would be somewhat tedious - a 'textbox' is quicker. On the left toolbar, 'click' on the 'abc' item. If you now point somewhere in the booklet area and press and hold the left mouse button, moving your mouse left and down will draw an outline rectangle - release the button and you have a 'textbox'. To write in your titles, right-click inside the box, select 'properties' and in its window choose the 'textbox' tab. In this window you can select a font, type in your titles and click OK - however, note that although the textbox itself can be expanded or reduced as before, the lettering stays the same size, so you need to select the right font size. If you get it wrong you don't need to retype everything - just choose the textbox 'properties', select a different size and the whole lot changes. The textbox background colour can be changed in 'properties' by selecting the 'brush' tab.

For the back of the case, select the 'inlay' tab and proceed as above. You can use 'cut and paste' techniques to make the inlay the same as the front, but additionally you will need titles for the case edges. You can see that, when the black squares are visible, there is a curved double-headed arrow near the top right square - this enables you to create edge titles, because if you 'click and hold' on this arrow, moving your mouse will rotate the whole title, which can then be moved into the indicated edge strips! This doesn't apply, however, to textboxes, which can't be rotated.

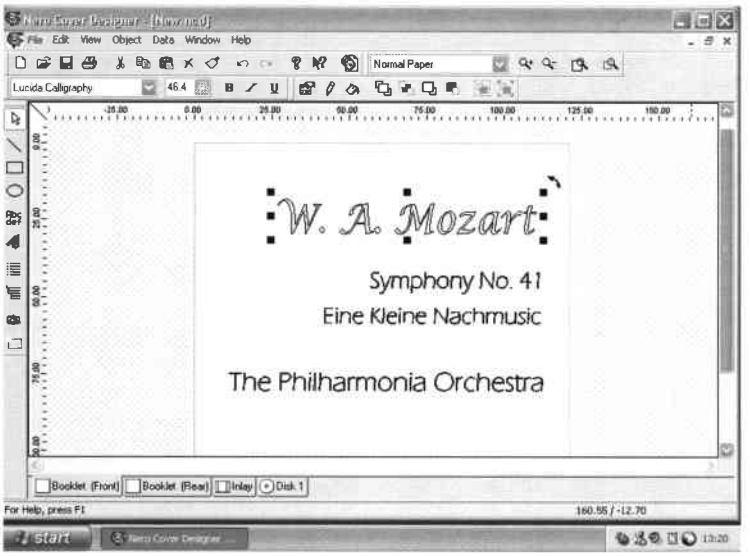


Fig. 1. The Nero program's Cover Designer.

When you eventually print your masterpiece, a few minutes with a sharp knife and ruler will complete the exercise - Nero even prints little markers to show exactly where to cut!

One final point - there is a tab for creating a disc label, but I would counsel against doing this. CD players are designed to cope with slightly imperfect CDs, but unless your label precisely positioned and cut exactly circular you will almost certainly exceed the limits of the player's error corrector and cause track skipping. A safer option is to buy one of the 'CD label' kits, which include an applicator to ensure the label is placed accurately.

Modifying Sound (powerful stuff this)

Now we come to what I promised at the end of Part 1 - improving the sound of your recordings. For this you will need the Nero Wave Editor, and you may need to refer to the section 'Editing Your Music' in Part 1.

The easiest trick is removing background noise. Call up one of your files by choosing 'open' from the FILE menu. At the start of the waveform there will be a flat bit before the music starts. Select this part as described in Part 1, but be careful you don't include any part of the music. Now click on the 'play' button and you will hear nothing. This is not the waste of time it might appear, because if you increase the volume to maximum, you will hear the background noise that exists on your recording, which we are now going to remove! Click on ENHANCEMENT in the menu bar, choose 'noise analysis', and the noise will be measured and the result displayed on a panel together with a slider to adjust the percentage noise reduction - I have found no obvious reason not to choose 100%, so point to the slider, press and hold the mouse button and move the slider up to the top, and finally click on OK.

Now select the whole waveform, and choose 'noise reduction' from the ENHANCEMENT menu - don't change anything on the panel that appears, but simply click the OK button, and the noise will be removed. To check the effect, select the same flat bit again and 'play' it at maximum volume - you should hear virtually nothing. DON'T FORGET to turn the volume down afterwards, otherwise you could be in for a nasty surprise! If you are happy with the result, it is a good idea to 'save' the file, but choose 'save as' and give it a new name if you want to retain your original file. Note that performing the 'noise analysis' does not itself change anything - you have to select the whole waveform and choose 'noise reduction' to apply the results of the analysis.

Hereafter, things get complicated, so if you are not into frequency response, decibels, octave filters and such, I should ignore this part - in any case, you may well have decided that your recordings are already perfectly acceptable. You might, however, think that one has too much bass, or treble, or not enough of one or the other, so open the file (choose 'open' from the FILE menu) and 'select' the whole waveform as described in Part 1 - now click EQUALISER on the 'tools' menu.

I was going to go into some detail about the equaliser, but it occurs to me that, quite apart from the fact that this article would be double the length if I did, those of you who know about such things won't need much instruction because the equaliser is virtually self-explanatory.

Nero provides a 6-band equaliser, and in its window you will see a set of sliders (one for each centre frequency) and knobs to adjust the bandwidth of each band. These can be altered by pointing at any of them and holding the mouse button while you move the mouse. Interestingly, below the sliders is a frequency-response graph which starts off flat, and changes as you make your adjustments. There is also a panel labelled PRESETS which offers (via a 'click' of the down-pointing arrow) a selection of preset functions like, for example, Bass Lift, Bass Rolloff and even one called Cheap Radio!

Better still, you don't have to guess at the required frequency response because, by using the 'preview' play and stop buttons on the panel, you can make all adjustments while your piece is actually playing. Once it sounds as you want it to, click OK and the equaliser window will close and your settings will be applied to the waveform. So far, your original file is as unchanged, so if you are happy with the result you can choose 'close' on the FILE menu to store your modified music - choose 'save as' and rename it if you want to keep the original file.

That more or less brings me to the end of what I needed to say about CD burners, and I hope that, in writing this article, I have encouraged you to explore the facilities hiding in your PC, because the programs now available have become much more user-friendly than they were a few years ago. I think my final word should be to assure you that you are most unlikely to cause any problems by playing around with your music files. The only precaution necessary is to ensure you 'save' to your original file if ONLY you are sure you want to overwrite the original - if not, then 'save as' to a new file. ■

C. F. Lecoultre in 1869

His rare diamond stamp was shown in Oddments 94 Fig. 9, and here Fig. 1 shows the movement, a snug fit in its case. The 7" (18cm) cylinder plays four airs. Made in 1869, it is a survivor from the days when many people buying one of these small musical boxes preferred a 100-tooth comb to a couple of extra tunes. The serial number is 37918, shown on the side of the winder in Fig. 2.

The cylinder diameter is 4 cms (1.56") so the circumference is 4.9" and tunes last a good 45 seconds. Pinning at 0.1" per second had certainly become the norm at this period. The 100-tooth comb has every pitch change marked, see Fig. 3. The tuners always had a tricky job, trying to leave enough metal to support a damper pin and yet reduce the tooth end weight sufficiently to get the frequency high enough. They failed on just one tooth here as shown in Fig. 4.

The tune arrangers must have been well satisfied by these combs. As can be seen in Fig. 3, there are many groups of three teeth of the same pitch, and the majority of other teeth are paired. The relative stiffness of the 440Hz *a* teeth is 180.

The bass lead is in Fig. 5, heavily scribed 176. I think the most likely explanation of this number is that it is an abbreviation of 9176 which is about right for the gamme number of serial 37918. The Lecoultres ran their gamme numbers continuously, like Nicole.

The argument for having plenty of comb teeth is very well supported by this box, notably for its distinctly above-average-performance of tune 4. It is an extremely colourful version of *Rule Britannia* with surprisingly good bass support from a comparatively small case. In fact, this is a very satisfactory and enjoyable movement.

In sharp contrast, the case inspires much doubt and confusion. The lid marquetry is attractive, Fig. 6, but on opening the lid doubts crowd in... Fig. 7. The eye is first caught by the London agent's transfer. But Imhof and Mukle only opened their office at 447 Oxford street ten years after this box was made. Then, you can just see that the hinges have been replaced, - the new ones are too narrow for the case slots. Also, you can see two sets of tune sheet pin holes but, not surprisingly, no tune sheet. So that lid is certainly not the one originally sported by serial 37918.

Still, it is a nice lid, and it was easy to make good the gaps around the hinges and treat with black french polish.The rest of the case interior has red polish - this was the period of changeover from red to black.

Any shocks so far recorded faded to nothing on examining the bottom of the case, as shown in Fig. 8. There you see 37918. But it is in huge thick black writing followed by the

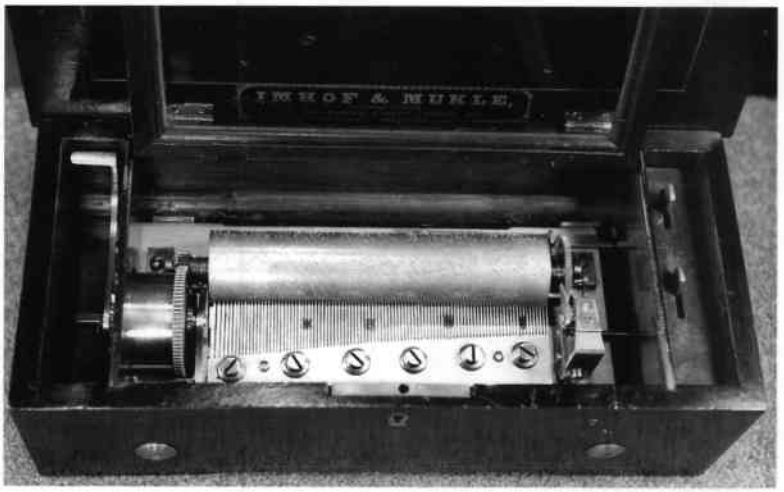


Fig. 1. C. F. Lecoultre 37918 in its original case with red interior. The marked a teeth cover four octaves, from 440 to 3520Hz.

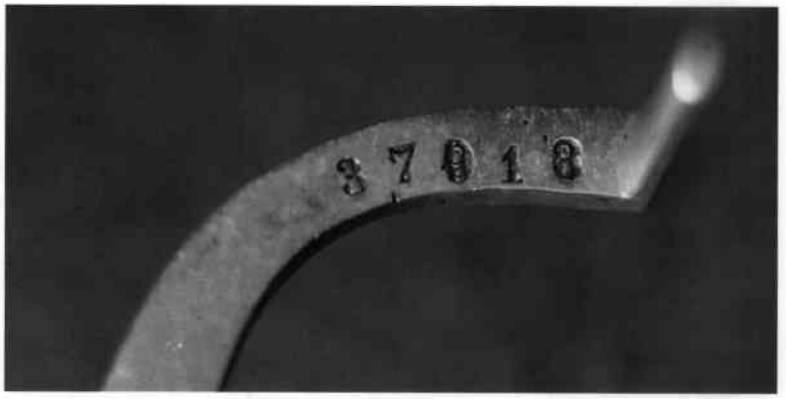


Fig. 2. Serial 37918 (with stuttering 9) on its winding lever. The domed surface of the grip proved unsuitable for the diamond stamp.

Fig. 3. Part of 37918 comb, pitch marks showing several groups of three teeth.

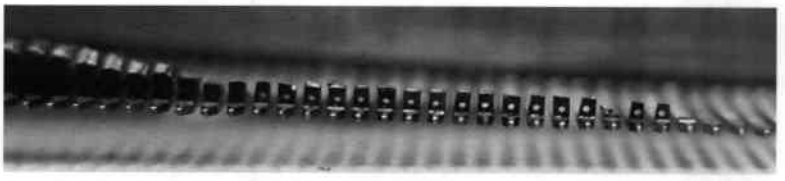


Fig. 4. Tooth 60, unlike 61 and 62, lost its damper holder to get in tune. That shows how the teeth often varied in width and local thickness.

The tuners always had a tricky job, trying to leave enough metal to support a damper pin and yet reduce the tooth end weight sufficiently to get the frequency high enough.

musical box oddments no. 96

cylinder length, 6½ P, (equals 7") - all done in the style used by Bremond. I cannot think up a plausible explanation for that.

Almost all the bass end cylinder pins had been knocked over by a run or runs but the rest of the cylinder was in good condition, so I decided to do a partial repin.

Fig. 5. Bass lead of 37918, scribed *r* and a double cross below 176.

Partial repin

If there is a badly damaged area at either end of a cylinder, the rest being O.K., it may well be worth a partial repin which has the great advantage of preserving most of the original pinning. That was the case with Lecoultre 37918, so the first step was to make certain that the pins to be preserved really were O.K. - I did not want to find them breaking during straightening.

This tiresome pin straightening job is best done in short spells, wearing a 3" clip-on lens. I use a simple stand as shown in Fig. 9. Start by correcting any pins bent slightly backwards as a legacy of the run. They must be left radial or slightly raked forward so that when slightly re-raked they will come in line. It is easiest to check them from each end of the cylinder up to the halfway mark. Then, track by track, pins must be viewed and the odd ones bent sideways made straight. Incidentally, all that is a duty expected by any 100-year-old cylinder, repinned or not!

I will just outline the partial repinning procedure: full details are available and could be published on demand.

Fig. 8. Bremond style writing under the case.

Mark the first lightly-pinned tune track beyond the damaged area clearly all round the cylinder and protect the preserved length by wrapping with corrugated paper.

Remove the end cap and melt out the cement slightly beyond the marked track. Complete the removal by standing the cylinder in paint stripper up to the marked track.

Thoroughly protect the preserved length of the cylinder by coating with thick grease and then stand the cylinder in sulphuric acid to just below the marked track. With ambient temperature 68° F or 20°C and acid of specific gravity 1.14, it takes 24 hours to remove the pins. Then wash and neutralize the stripped length, remove the grease, and again protect the preserved area.

Melt and replace the removed cement, line up and replace end cap, insert arbor and set up in lathe to centrifuge at about 350rpm. Then grind the new pins till they are about 2 thous proud of the existing raked pins. Finally rake the new pins and then set the raking tool in by about half a thou to confirm the raking of the whole cylinder.

It all paid off quite handsomely for Lecoultre 37918.

I have included Fig. 10 because it is an informative view of a cylinder's inside. It clearly shows how the pin holes are lengthened and thereby provide a safer anchorage. This in turn is due to the simple and ingenious drilling technique invented by the Swiss makers. They filed a triangular pyramid about 1mm high at the tip of a piece of pinning wire; heated it to cherry red and quenched; used it as a combined drill, broach and swaging tool giving a lengthened hole of exactly wire size.

This in turn is due to the simple and ingenious drilling technique invented by the Swiss makers.

Fig. 6. New lid, mysteriously acquired.

Fig. 7. Eight tune sheet pin holes... but no tune sheet.

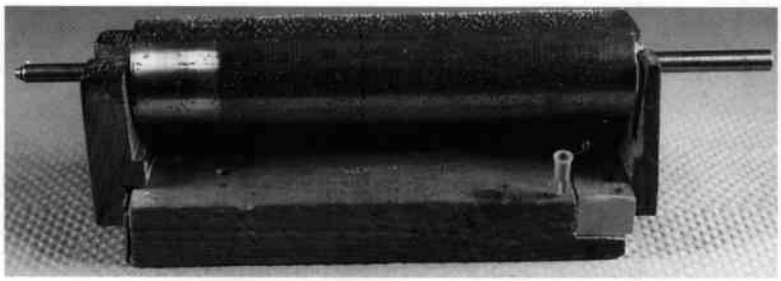


Fig. 9. Stand for pinning, polishing, etc. etc. Card washers at the right, where I always place the treble end, hold the cylinder firmly but allow easy rotation, keeping the snail cam follower clear of the support. Pin adjuster with its clearing wire, end curled for safety against pin-pricks, is in one of its parking holes.

Fig. 10. View inside 37918 cylinder, showing how all the pin holes are lengthened.

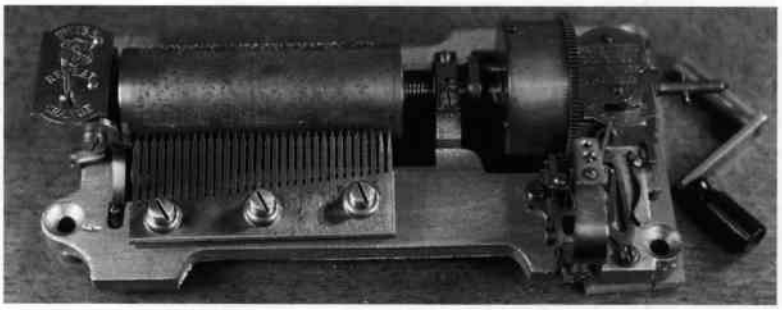


Fig. 11. Mermod 74117. The arbor spring at the treble end bearing keeps the cylinder in contact with the tune change cam.

Fig. 12. Tune change cam. Dots mark the centre of each step. The drop from tune 6 to tune 1 is comparatively gradual.

Fig. 13. Groove in the bass end cylinder cap to operate the tune change cam.

Freddy Baud demonstrated it to Geoff Mayson and added "A few of these will do a cylinder." Anyone can do it, and it works. More detail in Vol. 17 page 58.

Mermod Frères in the 1890s

By 1890 Mermod had fully adopted their productivity improvements at their large factory in Ste. Croix, and were making 8,000 cartels every year. Their cylinders ranged from 3½ to 18 inches (9 to 46cms) and, like the Paillards, they made almost all the parts themselves.

These boxes all had the same in-line design, with integrally cast bearings for the winder, spring and cylinder, except that interchangeable models had special brass cylinder bearings. The only machining needed on the back half of the bedplate was for the bearings, so the rest was left in the "as cast"condition. The front half was planed as usual to give flat surfaces for the comb and governor and stop lever.

Most of the larger models had a tune indicator and selector and an instant stop, but these were omitted from the smaller models where the market preferred lowest possible prices.

The cases for all these boxes had a partition for the winding handle at the bass end beyond the glass lid, so you could always get at the winder but had to lift the lid to start. I think these boxes were intended to be played with glass lid open, which certainly helps at the piccolo end.

That supports the theory of larger cases bringing larger sales!

A typical example of Mermod's smallest cartel is in Fig. 11. Its 3½" cylinder plays six airs, serial number 74117, made in 1893. Its case is 11 by 5½ inches; but a few years later this had gone up to 14 by 7 as listed in the Heeren catalogue of 1895/6. That supports the theory of larger cases bringing larger sales! More detail on Mermod boxes and the Heeren catalogue are in my second book, pages 28-30 and 153-157.

The tune change mechanism on these smaller (and cheaper) models is a simplified version of Mermod's combined tune changer and selector. It consists of a circular cam with six steps as seen in Fig.12. This cam can be turned one step at a time by a groove cut on the bass end cylinder cap, see Fig.13.

musical box oddments no. 96

When the Change/Repeat lever is pushed back to Repeat its lower arm clamps the cam so it cannot move to the next tune. When set to Change the cam is freed except for the small restraint spring shown in Fig.14. A small brass shoe fitted to the cylinder surface at the tune gap lifts the restraint spring clear of the cam during the tune shift.

I think the governor on this box is the simplest of Mermod's re-designs. The conventional governor block is replaced by a pair of side plates, flanged for bolting to the bedplate. Two cross-members fix their positions and a single bolt holds them together, see Figs.15 and 16. The rest of the design is conventional except that the usual stop lever is replaced by a rather complicated (but very effective) stop lever pivoted on the bedplate. It has two fingers; one bent upwards to contact the governor stop arm when the other enters the stopping slot drilled into the face of the spring gear. The Play/Stop lever either holds back this finger or frees it to enter the stop slot, - as can be deduced from Fig. 17.

There are no markings on the mechanism except the serial number scribed on the bass end cap and stamped on the treble end cap and the cylinder bearing cover; and the comb markings shown in Fig.18.

Good value in 1895 @ $15.63 from Heeren's store in Pittsburg, USA.

Fig. 14. Cylinder shoe holds the restraint spring clear of the tune change cam at the tune gap. The Change/Repeat lever is in Change position, with its lower member pulled away from the cam.

The cylinder diameter is 1.3" (33mm) so the circumference is 4.1". These boxes are pinned at 0.1" per second, so one turn takes 41 seconds. The tune gap is generous at 0.4" so tunes last 37 seconds. This well suits one verse of most of the six hymns which include *Lead, kindly Light*. It has quite impressive chords. Good value in 1895 @ $15.63 from Heeren's store in Pittsburg, USA. ■

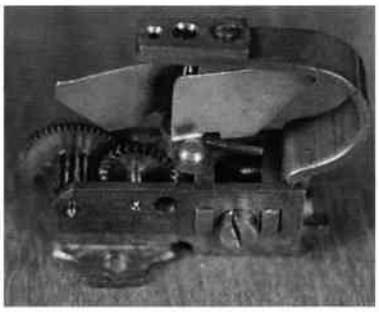


Fig. 15. Mermod governor, with large screw holding the two side plates together.

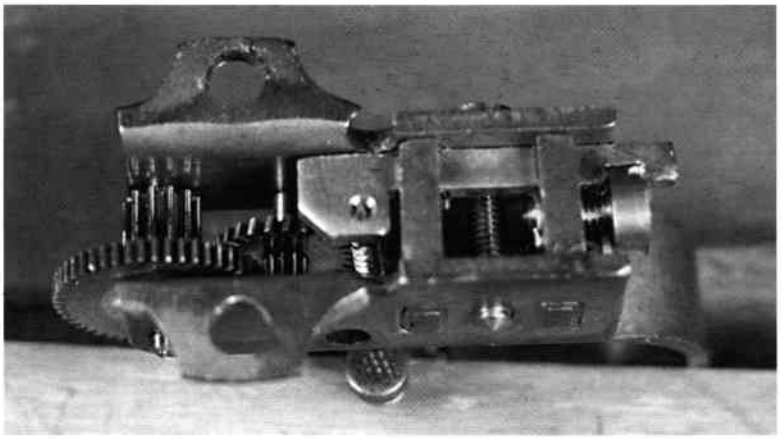


Fig. 16. Underneath view of governor, showing the flanged side plates and the conventional adjusting screw for the lower bearing of the endless.

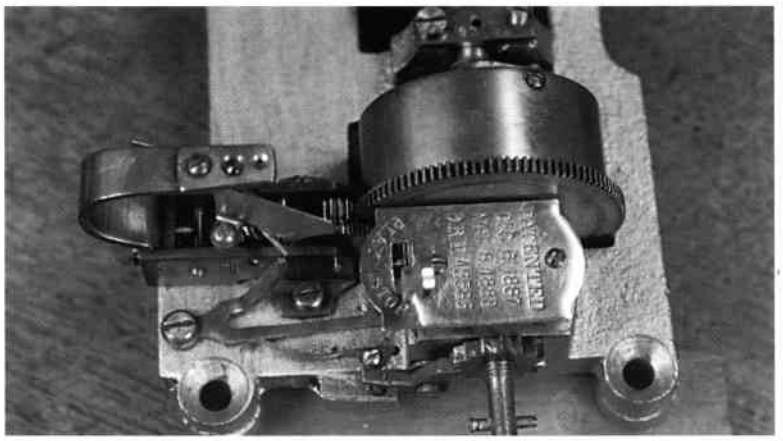


Fig. 17. From the top:- cylinder bearing with oil hole, fixing screw, and grub screw for adjustment. Set screw in rim of spring barrel for accurate location. Play/Stop lever with escutcheon listing Mermod patents. Ratchet wheel. Extended spring arbor with pin for crank handle. Also, pivoted near the bedplate edge, the stop lever. Its raised finger has contacted the governor stop arm. The other finger, flat on the bedplate, is sprung against the spring barrel when the lever is set to Stop.

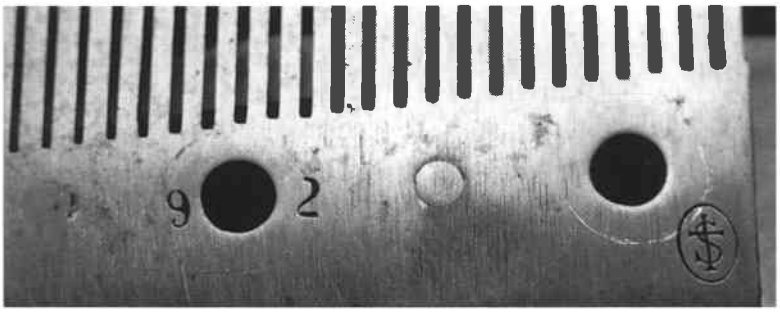


Fig. 18. Serial 74117 comb stamped 92 astride its centre screw hole - possibly the gamme number. Also stamped with Mermod's trade mark.

Waldkirch Street and Fairground Organs

By Herbert Jütteman - translated and published by A.C. Pilmer
Hard bound - 245mm x 175mm
300 pages
330 diagrams and tables
50 full colour plates.

If you have any interest in any aspect of street and fairground organs, this is the book for you. Waldkirch has been the home of so many of the big names in organ building from Ignaz Bruder, Grebrüder, Wilhelm Bruder Söhne, Ruth, Gavioli, Limonaire to Carl Frei, that any examination of its products makes essential reading.

First published in the original German in 1993, this new edition translated and revised by Andrew Pilmer brings Herbert Jütteman's encyclopedic knowledge to English readers for the first time. Translations of technical subjects can be tricky, leading to phrases which may leave the reader slightly puzzled - or downright confused. Andrew Pilmer's translation avoids this trap, and at no point in the text is the reader made aware of the original language.

The book is divided broadly into two sections: 1 - construction and the technical aspects of organ design and building, and 2 - the Waldkirch firms and their products.

In the first section there is a comprehensive coverage of Terminology and how organs work, a brief history of mechanical organs, through to considerable detail on pipe design and construction, pipe layouts, bellows, pneumatics, registers and playing systems. Whether your interest is general or specific to a particular aspect of organ operation, the answer is likely to be found in this section.

The text is in a precise style which leaves no unanswered questions and yet is easy to read. The illustrations, in particular the line drawings, are of a quality which is a delight to the eye - fine examples of draughtsmanship.

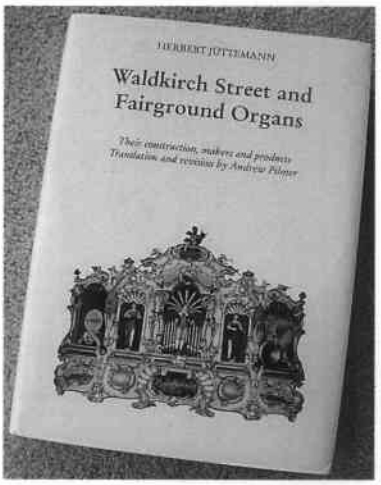
The 50 colour plates illustrate some of the finest examples of organ building, and whether you want to be amazed at the sheer exuberance of facade carvers and painters, or carry out detailed research, this section bears repeated examination.

Finally, in the second section, there are details of the Waldkirch makers; their history and relationships, and their differing styles and sounds. Tuning scales for all the makers are included together with details of music book spacings and widths. Nothing appears to have been left out!

For me, the detailed working drawings of so many pipes, operating systems and organ types were the highlight, but this book is so wide ranging that there must truly be something for everyone with any interest in organs.

At £29.95 it represents exceptional value, and we must be grateful to Andrew Pilmer for making this wonderful book available in English. Thoroughly recommended.

Available from A.C. Pilmer Ltd., Rufforth, York Y023 3QW. Tel: 001904 738309. Post and Packing £4.50 (UK only). Also available from Keith Harding, World of Mechanical Music - 01451 860181. ■



register news

By Arthur Cunliffe

Work on the Register at the present time is largely concerned with the work of the Nicole family and how they influenced the musical box industry. There are still large gaps in our knowledge and few contemporary written records of their work have survived to the present day. It is possible that some as yet undiscovered record of their work still survives in or around Geneva? Do we have anyone in Switzerland who is prepared to investigate all possible sources of information? If so, I for one would very much like to hear from them. Such work can be very rewarding

Many years ago in the times when John E.T. Clark was still alive and working, I seem to remember being told that there were at least two boxes that contained master tuning combs for Nicole. I believe they were sold in auction along with other items relating to Nicole Freres. Does any Society member know anything on this matter and, if true, where are these master combs today?

May I once again ask all members who have not already sent in details of their Nicole boxes to do so as soon as convenient. This new material can then be entered up, checked and added to the Register. I know it is asking a lot, but it important to record everything. Please make a super human effort to respond.

Declining membership seems to be a common factor in nearly all Clubs and Societies. The M.B.S.G.B. is no exception and as our older members "pass on", there seem to be fewer and fewer people joining to take their place. Youth is not the place to look for new members, as the young of any age have not been particularly interested in what the older generations did. They prefer to, "do their own thing"! Far better to target those who are a little older and who have settled down and have a little money to spare. Gain the interest of these people and sustained recruitment to our ranks may just be possible. How to do this is of course another matter. As they said in days gone by, "Answers on a post card please".

Strictly speaking the next paragraph has nothing to do with the Register, but it has a lot to do with restoration. Members will have noticed that these days it is becoming increasingly difficult to obtain specialist and top rate quality tools. All the large shops and Super Stores stock only a small range of common tools which have been made to sell at a low price. Power tools are often cheaply produced versions of the real thing with a short and happy life. Gone are the days when it was possible to find an ironmongers shop simply full of all sorts of wonderful things. Gone too are the assistants in brown coats who wore steel rim spectacles. They knew where everything was and what you were talking about. One answer to this problem is to make a visit to the local auction room from time to time. Among items in house clearance sales, sets of tools can often be found. Mostly they are in a sad state, but just occasionally some well-loved tools turn up that had once been the pride and joy of some craftsman. Such tools can often be bought quite cheaply and will repay their purchase price time and time again. Do not forget to look around local market stalls and car boot sales from time to time. These too can be very rewarding places . My glue kettle came from just such a place and is a fine example of the old cast iron type. It was bought at a quarter the cost of modern tinplate equivalent.

I hope that the New Year will be a happy and productive one for all. ■

letters to the editor

A New Inventor of the Musical Box

Following the article by Arthur Ord-Hume (Music Box Vol 20/7 page 219) Etienne Blyelle of Geneva adds his observations to the discussion on the origin of the tuned comb.

In the catalogue of a Sotherby's auction which took place on 19th. June 2002 in New York, among numerous and rare museum pieces is Lot No. 73 which is a signed musical watch.

The photos (Music Box 20/7) show the piece, from which one can see the two combs of six teeth. They are not stacked like those originating in Geneva, but screwed individually in two groups on two separate pillars.

The six short teeth are the same length while the bass teeth are unequal and relatively long because the cylinder diameter is smaller than the radius of the watch movement. The remainder of the pins are on the music barillet whose arbor exits a little after figure II of the dial.

The signature can be found on the ring which protects the movement (removed for the photo), and it has the following wording:

"The instrument was invented and executed by Ransonet of Nancy".

Regarding the date, it is shown on the box "Paris, 1772".

One cannot argue that the case had contained another watch movement without music because a very old text exists of the Association of Arts and Sciences

(Societe des Sciences et Belles-lettres) where it is stated (according to the catalogue) that he showed in 1770 a two-tune ('jouant en duo') musical watch for which he received a prize.

In what measure does this discovery further the cause of the paternity of Antoine Favre? We have already studied the case of the music of the "Goblet of Nagy".

Just as the design of the mechanism of Nagy militates in favour of an earlier work of 1750, the design of the mechanism of Ransonet to me seems very likely to be from 1770. Much like Favre it is quite probable that he knew of the music of Nagy.

On the other hand, the question as to whether Favre knew of the work of Ransonet arises because he is said to have miniaturised a carillon. The invention which he presented at the Association of Arts in Geneva is most likely to have been a tabatiere.

This is why, for the time being, we can conclude that the musical box has been invented three times, but the first two do not seem to me to have given a true musical movement.

Etienne Blyelle

A Ram in the Well...

I came upon the following recently in a book entitled A Ram in the Well by June Knox-Mawer. The author is a broadcaster and former presenter of Woman's Hour on Radio 4.

Here she describes the after-dinner entertainment given by Philip Yorke, the last squire at Erddig in North Wales before he handed the crumbling property over to the National Trust.

"Bemused, we found ourselves in what was called the Entrance Hall., This was a room where the Yorkes always entertained guests in the evening we were told, chamber music in the early days, no doubt. But the family moved with the times. Victorian and Edwardian mechanical devices were ranged on every side. Like some sorcerer's apprentice, Phil dodged from one to the other, winding them up into life, so that soon they were all playing together - the Swiss musical box, the Parisian polyphone, (sic) the Thomas Edison pohonograph. Even the Rheims Grand Forte had its own pianola, splendidly entitled 'the Metrostyle Thermodist Orchestrelle Company'. Once again we were snatched away into past as these echoes of vanished gaities filled the room, polkas and waltzes and trembling Puccini arias."

Are these instruments still at Erddig and perhaps on show (though they would never be played if the National Trust runs true to form!). Does any member have information on this?

Joan Rippengal

If the collection still exists I am sure someone in the Society will know of it. Let's hear from you. Editor.

110 years old and there is still a demand for new rollers (See P.23)

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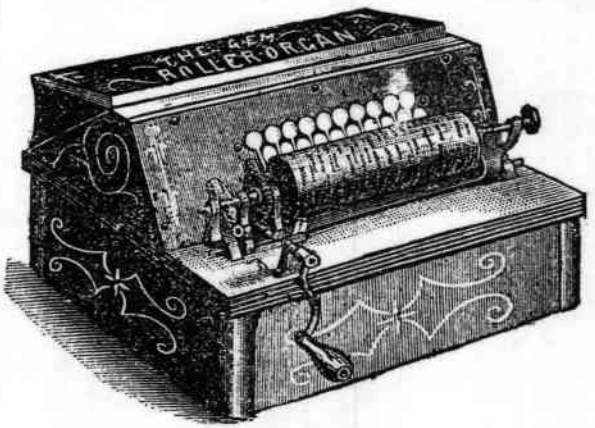

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obituaries

David Harrold

A member of MBSGB for close on 30 years.

David and I used to play a 6-bell musical box at our grandparents' house when we were about 6-8 years old. These memories live with you all your life.

In his mid twenties David bought his first musical box, and so the collecting bug was born. Always keen on small boxes, David studied and purchased several snuff boxes, mainly from the earlier period. He was also keen on earlier cylinder boxes and spent a lot of time studying and getting to know about them. He was able to identify most of the makers on sight and could be relied upon to spot things often missed by others. Never a quantity collector, he would only purchase boxes that had some quality about them, either unusual features, good tunes or some mechanical feature. Not one to love gaudy cases or over-restored movements, he always wanted careful, historical restoration; this taxed myself and other restorers at times!

Going to an auction or fair, or even a Musical Box Society meeting, was always an interesting time for both of us. Bouncing ideas, opinions and often lively debates were the order of the day. Usually at the end of it we had formed a consensus of opinion.

Not being married and having no family of his own, David spent quite a lot of time with my family who loved him a lot. Quite how I shall manage at meetings and auctions without his ideas and opinions I don't know. Sorely missed by family and friends, a likeable, knowledgeable, friendly companion, never forceful, but spirited to learn the truth,

John Harrold

Brian Campsie

It was with great sorrow that I learned that our fellow member Brian Campsie had died recently. Having shared and enjoyed his company on many occasions since his return to this country from Aldernay, I shall miss his forthright and determined approach to many of the activities with which he became involved.

Brian's mother, Mrs. J. Wadmore, was an early member of the Society (No. 272). She enrolled Brian during 1967/68 (he told me), although subsequent business interests caused a break from the Society membership. Subsequently, he organised a memorable Autumn meeting in Windsor (hotel opposite Windsor Castle) in September 1986. Recently he assisted Alan and Daphne Wyatt regarding this year's Paris meeting and had already made some arrangements for our Spring 2004 meeting in Canterbury.

An example of Brian's deviousness was to set me up with a group of four golfers staying at our hotel at Cirencester during our Autumn 1987 meeting. There were hot air balloonists active locally and he persuaded these four golfers to pretend to be balloonists and to offer me an early morning flight. Due, probably to an excessive consumption of the "water of life" and the connivance of our then meetings secretary, Alison Biden's husband Mike, I fell or it. The end of the story is that when I stayed with Brian at Sandwich, he had recently acquired, from a local auction house, a large model of a balloonist which he had intended to hang over the bed that I was to sleep in. He subsequently repented and hung it outside fearing that I might have suffered when waking up during the night to see this hanging above me.

The memories we all have of people like Brian will only die when we ourselves join them.

John Powell

John Young

It is with great sadness that I have to report the death of John Young, a long time member of the MBSGB.

I had known and worked with john for 42 years. He had tremendous skills in mechanical engineering having trained with Stanley the London scientific instrument makers. After a spell in the RAF he spent 40 years working as an instrument maker in Lincoln. John's motto was 'if it was built by a man I can make it'. He could repair anything from a musical box to antique firearms to classic motorcycles. Members will remember the three Triolas he made exact copies from an original.

Some of you will remember John from the Lincoln meeting in October when, although already seriously ill, he opened his house to over 50 members. He told me how he had thoroughly enjoyed sharing his collection with fellow enthusiasts. Sadly, he died only a few weeks later, and I am sure that all members would wish to pass on their condolences to Janice and all the family. **Roy Ison**

John Young

"On the recent death of my husband, John Young, I would like to extend my thanks to everyone who sent cards and letters, they are much appreciated. Also many thanks to everyone who helped John from time to time, namely, David Walch, Ted Brown, Arthur Ord-Hume and Anthony Bulleid. Special thanks to Roy and Mary Ison. Please forgive me if I have missed someone out. John was so pleased to play host to a number of members when they visited Lincoln in October, this gave him an enormous boost in the midst of his illness." **Mrs Janice Young**

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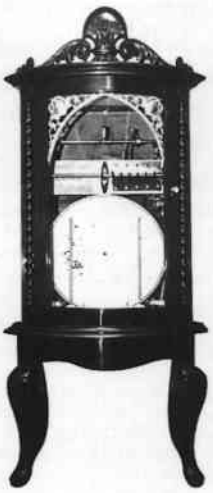

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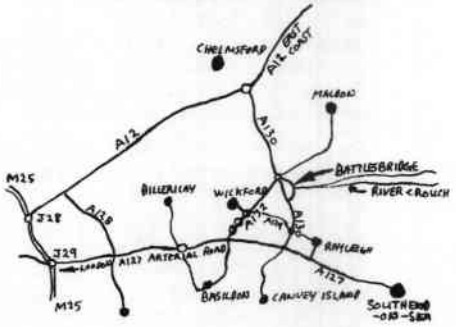

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