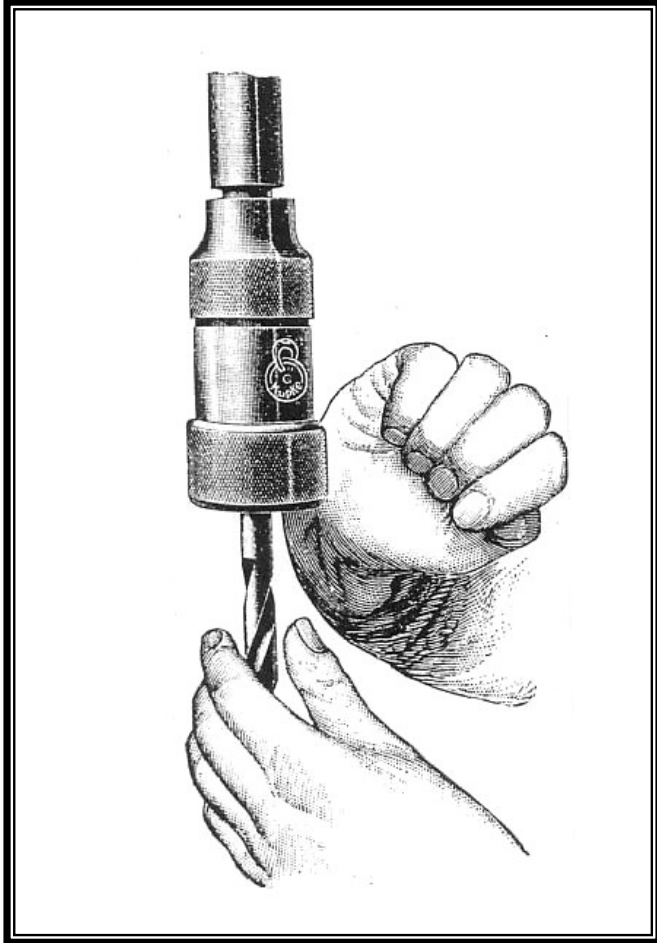


TGT



**Newsletter Number 75.**  
**February 2004.**  
**The Traditional Tools Group (Inc.)**  
**[www.tttg.org.au](http://www.tttg.org.au)**

**TTTG Inc.**  
**THE TRADITIONAL TOOLS GROUP (Inc.)**  
**TTTG Newsletter Number 75. February 2004.**

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**Cover:** "Reliance" Drill Chuck, undated T M Goodall. Sydney Catalogue.

**2003/2004 Subscriptions are due.**

**Subscription Rates:**

Sydney \$30. Overseas \$30.

Out of Sydney, Other States and Australian Pensioners \$22.50.

**Postal Address.**

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Bob Crosbie

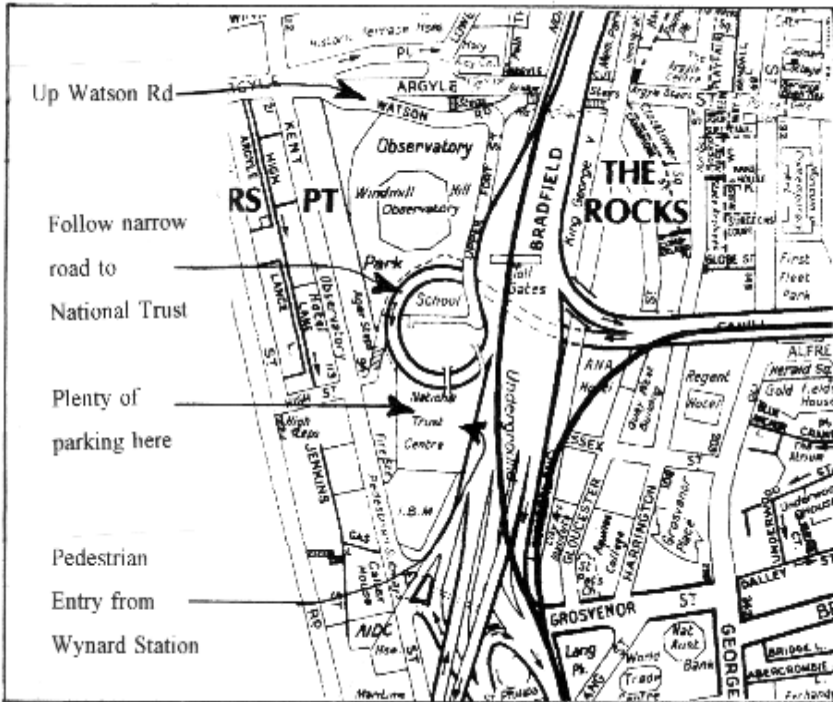
[r.crosbie@bigpond.com](mailto:r.crosbie@bigpond.com)

**[ttdg.org.au](http://ttdg.org.au)**

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**Next Meeting**  
**National Trust Centre,**  
**Observatory Hill.**

**Tuesday 10<sup>th</sup> February 2004**  
**Annie Wyatt Room**  
**Commencing at 7:00pm**



### **PROGRAMME**

- 1. DAVID NEWBOLD IS A LEADING BOOKBINDER WITH 40 YEARS IN THE TRADE. HE HAS WORKED FOR OVER A QUARTER OF A CENTURY FOR THE MITCHELL LIBRARY AND NOW RUNS HIS OWN FIRM. HE HAS AGREED TO TALK TO US AT OUR FEBRUARY MEETING. DON'T MISS IT.**
- 2. THIS WILL BE FOLLOWED BY FRED'S WOTSIT.**
- 3. THEN OUR FUN AUCTION.**
- 4. SUPPER BY MARIO DATO.**

**Previous Meeting.**

**National Trust Centre.**

Annie Wyatt Room.

Observatory Hill. The Rocks.

**Tuesday 9<sup>th</sup> December 2003.**

Commencing at **7:00 pm.**

**Topic: Tools used in model ship-building. Speaker: Darren Ryan.**

Darren covered the relatively traditional practices/methods of ship model building. He provided an interesting insight into how he uses hardly any power tools and relies on mostly traditional hand tool methods.

The main areas of ship model building were discussed in depth. These included planking the hull, making details, fitting, masting and rigging.

Darren brought along some of the home-made and miniature/specialist tools he uses. These tools included planes, gauges, squares and scrapers. A miniature ropewalk was demonstrated and generated lively discussion.

The interest from the audience was so great that, together with questions we ran significantly over time, testimony to the quality of Darren's presentation

**Next Meeting.**

**National Trust Centre.**

Annie Wyatt Room.

Observatory Hill. The Rocks.

**Tuesday 10<sup>th</sup> February 2004.**

Commencing at **7:00 pm.**

Our next meeting topic on 10<sup>th</sup> February will be on bookbinding. We have been very fortunate in that David Newbold a leading Sydney bookbinder has agreed to address the meeting.

David has worked in the bookbinding trade for over 40 years. He did his apprenticeship with the Government Printing Office and worked in the Mitchell Library for 26 years before striking out on his own in 1989. Some ten years ago he formed Newbold and Collins, a successful local bookbinding business.

Books are the tools of the mind and their conservation and repair is no less important than the maintenance of physical tools. This promises to be an absorbing and valuable topic and a fitting start to TTTG's activities this year.

**2004 TTTG Workshops.**

**February 22.**

**Sharpening wood working edge tools.**

Learn how to achieve razor edge sharpness.

**March 28.**

**Plane Tuning.**

Learn how to get the best performance from planes.

**May 16.**

**Saw Sharpening.**

Learn how to sharpen saws for efficient hand sawing.

**June 20.**

**Metal working skills.**

Learn basic bench and metal machining skills.

**August 22.**

**Hand planing.**

Learn how to use hand planes to achieve accurate work.

**September 19.**

**Moulding planes, fillisters and ploughs.**

Learn how to set up and use moulding planes.

**October 17.**

**Combination planes.**

Learn how to set up and use combination planes.

**November 21.**

**Shaves and Scrapers.**

Learn how to use all types of spokeshaves and scrapers.

All workshops commence at 9.30 am and conclude at 3.30 pm.

**Venue:**

All workshops are held at Asquith Boys High School. Jersey Road Asquith.

---

**Cost:**

**Members: \$20**

**Non Members:\$40**

## **Editors Notes.**

### **What will TTTG do in 2004?**

2003 was a good year for TTTG. 2004 will be even better!

---

### **The General Meetings.**

- Attendance figures were high in 2003.
- The Auctions were quite successful so they will continue.
- The Venue is a bit stretched but it remains our best option.
- You can look forward to interesting speakers and bargains.

### **The Newsletter.**

- Better print quality.
- Enlarged format.

### **Publications.**

- John's Pages.
- Reprint Catalogues.
- Tools made by TTTG members.
- TTTG Library Catalogue.

### **Classes.**

- It is obvious that there is a demand for "hands on skills based" classes.
- In 2004 all TTTG classes will be held on non-commercial premises.
- These have to be the best value for money classes on offer.
- Some of the classes are offered nowhere else.
- See **2004 Workshops** for details.
- If you have an idea for a class please contact the editor.

### **The Library.**

- The TTTG Library continues to grow.
- Storage has become a major concern.
- Publication of a Catalogue may give some basis for negotiation.

### **Public Events.**

- In 2004 TTTG will do it better than ever at such events as
- The Sydney Timber and Working with Wood Show.

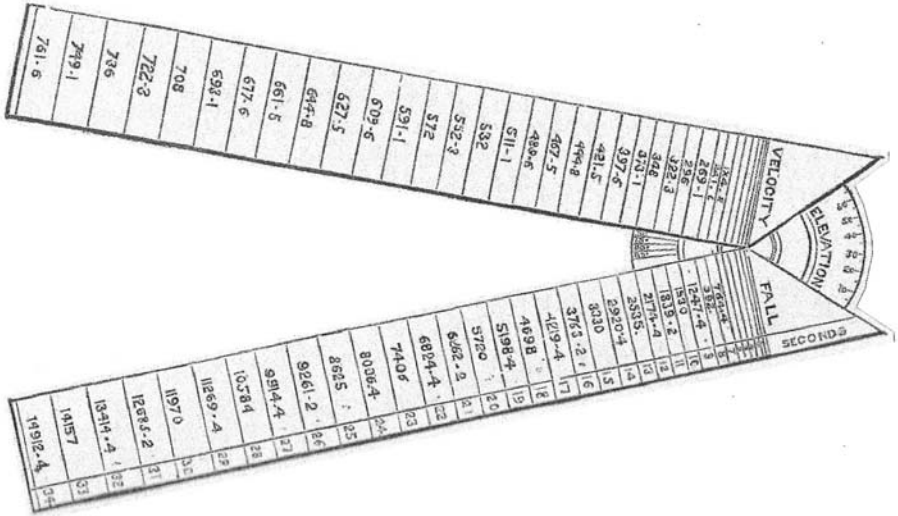
### **Fees.**

- Still the lowest membership fees. Fees will not rise for another year.

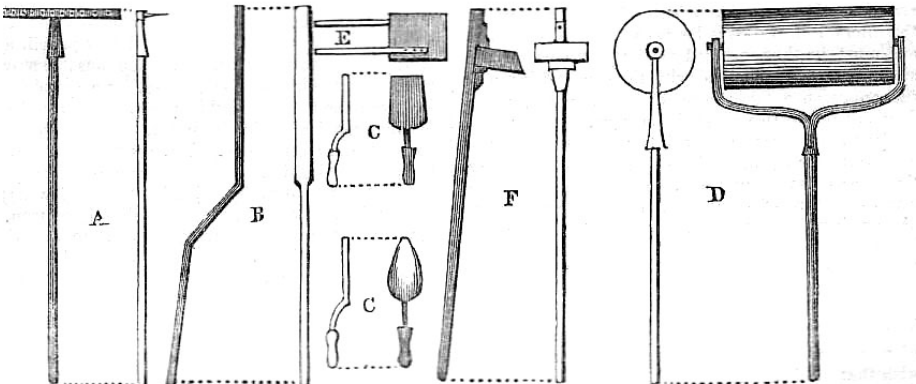
**What is it?**

The mystery tool in News 74 was a Hub Boring Machine. (See Ken Turner's Article overleaf)

**What is the tool below?**



**What are these tools?**



## THE WHEELWRIGHT'S BOXING ENGINE

by Ken Turner.

The tag 'Wheelwright's Boxing Engine' conjures up in one's mind a complexity of powered moving parts, not a manual hand tool which surely it is. It is also known as a boxing machine, or as a hub or nave borer.

This tool is used, after a pilot hole has been bored in the nave of a wheel, with an auger.

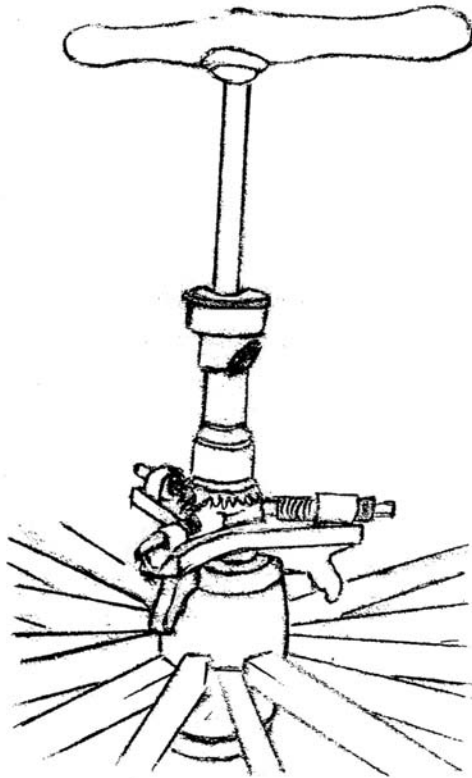


Fig 1

## The Wheelwright's Boxing Engine (con't)

The nave borer (boxing engine) enlarges the pilot hole, so that it can house what is commonly referred to as a 'box', which is actually a cast iron bush or bearing with a tapered or parallel bore which rotates on the axle.

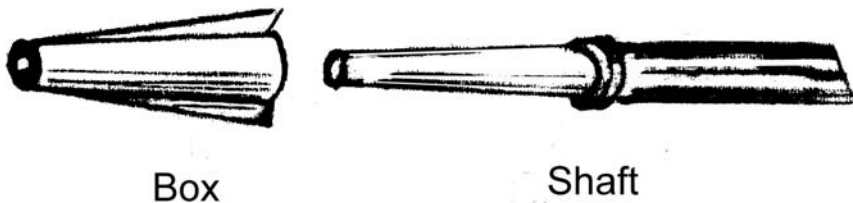


Fig 2

The manufacturer Dole & Darning in Ohio, U.S.A are credited as being the originator of the basic design of this nave borer, in about 1897. Patents covering the later-added adjustable feed nut and gauge plate (shown incorporated in fig 1), were taken out in about 1899 by the firm Silver & Deming, also of Ohio, U.S.A.

### References

Nelson, R. (Ed.) DIRECTORY OF AMERICAN TOOL MAKERS.

Pub: Early American Industries Assoc. U.S.A. 1999

Peloubet, D.(Ed)WHEELMAKING - Wooden Wheel Design & Construction.

Pub: Astragal Press, U.S.A. 1996

Wright, J. & Hurford, R. MAKING A WHEEL - How to Make a Traditional Light English Pattern Wheel.

Pub: Rural Development Commission. U.K. 1997.

ILLUSTRATIONS by the writer.

**Correspondence.**

The Editor,

Here is the scan of the Nicholson file I mentioned.

Alongside is a standard Wiltshire file.

Were both files made by Wiltshire?

I assume it is a registered trademark!

Steve Flint.



**CARTER Tools.**

CARTER Tools were a significant manufacturer of Australian made hand tools. The TTTG Committee is examining the possibility of a Carter Tools Exhibition. CARTER Tools were located in Parramatta so it would be appropriate to have the proposed exhibition in Parramatta.

The first stage is for members to commit themselves to lending CARTER Tools. We would also be interested in any documentary material such as advertisements, invoices and packaging material.

CARTER Tools produced a wide range of tools as well as the well-known planes. Examples of CARTER Tools' precision tool making instruments are needed.

**EMAIL THE EDITOR ON [r.crosbie@bigpond.com](mailto:r.crosbie@bigpond.com)**

## **Events and Publications.**

### **Australian Made Machinery Directory.**

*Wood and Metal Working Machinery.*

**John Bates** is compiling this Directory.

Any information on the following would be appreciated.

- Australian made Engineering Machinery.
- Australian made Woodworking Machinery.
- Australian made Leather Processing Machinery.
- Miscellaneous Australian made Machinery.

We need original illustrations for the Directory so do you have any of the following?

- Old Catalogues by Australian Machinery Manufacturers.
- Old Leaflets by Australian Machinery Manufacturers.
- Old Invoices from Australian Machinery Manufacturers.
- Packaging material from Australian Machinery Manufacturers.

### **Carter Plane Leaflet.**

The Reprint of an undated Carter Tools colour Leaflet is still available.

Limited numbers are available so get in quick to secure your copy of this collector's item!

Cost is \$5 each, postage is extra.

### **John's Pages.**

Work is currently in hand on a compilation of articles by John Daniels.

The illustrations are being scanned and the format has now been finalised.

Layout design work has commenced and the projected publication date is mid 2004.

### **TTTG Library Catalogue.**

Work has begun on a TTTG Library Catalogue.

This will be an invaluable resource and copies will be available free of charge to TTTG members.

The projected publication date is mid 2004.

### **The Best of News.**

Do you want a back issue of News? Contact the editor **r.crosbie@bigpond.com**

A limited number of copies of back issues are still available.

### **Further Information.**

For full details of all TTTG Events see the Web Page. [www.tttg.org.au](http://www.tttg.org.au)

**Information.**

A number of chisels have been donated to TTTG.

They are in very good condition and suitable for inclusion in the Tool Collection but the maker's name drew a blank from the Committee members.

SWEARBY is a memorable trademark if you like puns but one that didn't appear to be all that common. They had a 1950s look so research started in that decade.

Peter Evans recently acquired a copy of Benn's Encyclopaedia of Hardware 1954 and this includes two advertisements for SWEARBY. Mystery solved!

TRADE MARK

SWEARBY TOOLS

1" FIRMER BEVEL  
EDGED CHISEL

SWEARBY  
SHEFFIELD

"SWEARBY" Tools are manufactured from the finest quality materials by craftsmen.

Illustrated catalogues, current price lists and other particulars on application.

**EDGE & JOINERS TOOLS**

Manufactured by—  
H. & T. H. COOPER LTD., SHOREHAM STREET, SHEFFIELD I.

**Information.**

**Potential TTTG Reprint.**

Benn's Encyclopaedia of Hardware 1954 is a valuable source of information. It includes a Glossary of Technical Terms in the Hardware and Ironmongery Trade. The TTTG Committee is considering reprinting this Glossary if there is sufficient interest.

**1950s Metal Planes.**

**SEDGLEY.**

This advertisement is taken from Benn's Encyclopaedia of Hardware 1954.



**HIGH QUALITY**  
*Builders and Carpenters'*  
**HAND TOOLS**

Manufacturers of—  
ALL STEEL SPOKESHAVES  
BLOCK PLANES  
METAL SMOOTH PLANES  
JOINERS' SQUARES  
JOINERS' BEVELS  
TRY AND MITRE SQUARES, Etc., Etc.

**Specialists in**  
**JIGS, TOOLS AND FIXTURES. GENERAL PRODUCTION MACHINING**

**SAMUEL BROOKES & CO.** GOSPEL END STREET, Telephone:  
SEDGLEY, NR. DUDLEY SEDGLEY 2233

The iron plane makers listed are:

- Anglo Scottish Tool Co. (Rapier)
- Brookes Samuel (Sedgley)
- H & D Churchill
- G F Gibson & Co.
- C & J Hampton (Record)
- Wm. Marples & Sons
- Turner Naylor & Co.

**Tools move around, don't they?**

I first saw it at the North Rocks Market. It was half a bow saw, the rear handle, the centre spindle and one end. I had picked it up and gave it the usual once over then momentarily sitting on the fence, put it back. "Too much work" I thought, although it was very old and had been much used. I later noticed one of our members carrying it around, so dismissed further thought of it.

My second sighting was at Dapto Markets a few months later. Perhaps it had been placed in the "Too hard basket" and passed on. As it was haunting me, I thought I had better take the hint, so for the outlay of \$3 (a dollar a piece) I accepted the challenge and took it home.

At first glance I thought the frame was Mahogany, however, on closer inspection I felt that it was a Eucalypt, perhaps Sydney Blue Gum. Now, to find a timber that matched. An Australian hardwood fence paling was the answer. Fence palings are usually made from Eucalypt off cuts, so it was just a matter of sorting through some timber in my wood rack until I found something to match the grain, texture and density. The colour can always be matched with a little experimenting.

To make the front handle I used a piece of English beech cut out of an old wood jack plane body. A good soak in some "Black Japan" before buffing matched it fairly closely to the rear handle.

To make the tensioning stick I used a piece of Cotoneaster, it's always a good substitute for Boxwood.

The brass centre shaft for the front knob/handle was turned out of a piece of brass bar; this was fitted into the blank for the handle before turning the handle. This assured perfect alignment of the two parts.

Well, did I waste my time? I think not. The exercise time wise, perhaps was not a financial proposition, however, I managed to save what might have been kindling and ended up with a nice little collectable, and I might add, learnt a bit along the way.

**John's Page (con't)**



**Fig 1. The original members of the bow saw after cleaning**



**Fig 2. The completed bow saw with its new 10 inch blade.**

## **Robert Towell. The Elusive Plane maker.**

Mick Doherty

I am a keen amateur plane maker based in Canberra who is intrigued by the British Infill Plane and its double dovetail method of construction. Armed only with Jim Kingshott's "Making and Modifying Woodworking Tools", my first attempts at plane making were somewhat frustrating due to a lack of specific detail required to successfully complete a plane. Eventually I found other like-minded enthusiasts on the Internet and we have started to rediscover the secrets of this lost art and a body of knowledge is being built up. A year ago I embarked on a project to write a book on making infill planes.

The legendary firm of Thomas Norris and Son is perhaps the most famous maker of the British "double dovetailed" infill style plane; producing them from around 1860 to 1944, but Norris was by no means the first to perfect this technique. There is clear evidence that Norris copied the designs of earlier makers although they did patent an ingenious but often ineffective mechanical adjuster in 1913.

Stewart Spiers was a prolific maker of metal planes who according to legend commenced his plane making business after making a substantial profit when he sold a finished plane for 18 shilling after buying the rough casting for 18 pence.

According to Mark Rees, Spiers commenced making infill planes around 1840 or soon thereafter. The story of Spiers and that of his firm has been well documented in Nigel Lampert's "Through Much Tribulation: Stewart Spiers and the Planemakers of Ayr".

Other professional plane making contemporaries include the firms of Edward Preston, Alex Mathieson & Sons, and the previously mentioned Thomas Norris. In addition, a number of cottage industry one-man shops turned out infill planes, and many more were user-made.

There is some debate as to who made the original infill planes. The earliest infill mitre planes of the normal English pattern started appearing in the latter quarter of the 18th century with Gabriel, Moon and Green as the major makers. According to Jane Rees and Mark Rees, the earliest professional maker of what we now recognise as an infill panel plane was Robert Towell of London, about 1830.

Little is known about Towell other than he was working around 1830. In a 1999 article, TATHS No 65, Mark Rees was able to deduce that Robert Towell, the son of Robert and Elizabeth Towell, was baptised on 24<sup>th</sup> June 1787 (aged 21 days) at St Stephen's, Stepney.

In addition, his father, a cabinetmaker, took out an insurance policy with the Sun Insurance company in 1774 and that the address is given as “Crown Row, near opposite the Harry’s Head in Mile End Road”. Mark Rees further deduces that if the young Robert Towell had followed tradition he would have completed his apprentice in 1808 and might well have started making planes around that time. If that were the case he would predate Stewart Spiers as the earliest specialist plane maker by around thirty years. Mark Rees does qualify this by recognising that Christopher Gabriel did make some metal planes, all mitre planes, that predate Towell, but for all intents and purposes Gabriel was a prolific maker of wooden planes whereas metal planes by Towell are more plentiful.

Robert Towell is more recognised for his fine rebate and mitre planes, but it is his very rare bench planes that interest me. These are very similar in style to what we now recognise as the Infill Panel Plane. As Mark Rees rightly pointed out, the Towell Panel plane is an excellent example of the transition from a mitre plane with its wrap around sides but at the same time it has the profile and features of the later planes made by Stewart Speirs and his successors.

Because of the importance of Robert Towell and his transitional plane, I would like to build a replica and feature it my book to highlight the development and evolution of the panel plane. I am aware of four panel planes made by Robert Towell and of at least one other that is a probable “Towel” plane although it is marked “Moseley”.

The TATHS No. 65 article features a plane in the procession of Mr. R.C. Funnell and a similar plane, owned by Alan Ferguson, was also featured in an article by Alan Beardmore in *Woodworker*, Nov 1978. I have written to both gentleman and to my delight they have both replied confirming that they still own these planes and were kind enough to provide details of their planes that I will share below.

Joel Moskowitz in the US owns what appears to be an earlier version. I have recently discovered a UK based owner, Michael Swede, who has both a panel plane and a smoother made by Towell. The smoother, as shown in Figure 3 below is very interesting indeed as it features a tapered sides – a feature that I always thought came much later. It should be noted that the metal smoother featured in the TATHS No 65 article looks very similar in style to a wooden coffin smoother and is very different to the one illustrated below.

From what I have been able to glean, the four panel planes (those owned by Funnell, Ferguson, Moskowitz and Swede) are of similar size and shape. All are constructed in a similar fashion to a box mitre plane with wrap around sides dovetailed into the sole and connected with a front piece dovetailed to the sides. A simple bridge with a Cupid’s Bow, tenoned between the sides, holds wedge in place on three of the planes.

On the Ferguson plane, the bridge is in the shape of an inverted “U” with a simple bevel under the “R<sup>T</sup> Towell” instead of the Cupid’s Bow.

A unique feature of the Robert Towell panel planes is the stepped mouth arrangement, which provides the tiniest of openings through which the blade protrudes. The sole is constructed using a two-piece sole connected by a tongue and groove joint in the similar fashion to that on a box mitre plane. Whilst the bed is angled at around 48 degrees for a typical double iron, the rear of the sole has been angled at around 20 degrees to accommodate the bevel so that the iron just protrudes through the sole. This appears to have been a transitional arrangement that is not reflected in later bench planes by Spiers and his contemporaries. I would be interested to know if your readers are aware of any other plane maker who might have used a similar mouth arrangement.

An interesting fact that has emerged is that at least one of the Towell panel planes does not have a tongue and groove joint but rather a dovetail occurs around the mouth effectively separating the sole into two pieces.

The side profile on all four planes appears to be the same, except that the drawing of the Ferguson plane has square sides lacking the curved recess near the bridge. Mr Ferguson has confirmed that this is the shape and that the curve is missing thereby in my opinion indicating an earlier plane but I'd need further evidence on this.

What complicates this assessment is that the Moskowitz plane features an elongated front cushion that differs significantly from the other two, although the closed tote is similar on all three. One explanation is that the front cushion might be a replacement, but it is the professional opinion of the dealer who sold the plane and the owner, that the infills (both front and rear) appear to be original.

Another difference, which might be an indication of age, is the metal plate or "frog", as Mark Rees called it that is apparent on the Funnell plane but does not appear on the Moskowitz plane. It is unclear whether this feature occurs on the Ferguson plane and whether the "frog" was an innovation early or late in Towell's career. Although functionally similar to the heel plate on later infill planes, the "frog" differs in that it is a plate secured by screws from the top rather than being a solid metal plate riveted to the sole.

Joel Moskowitz points out that the rear infill on his plane "is made of two pieces of wood. The first forms a 20 degree or so incline at the bed area and then fills the back part of the plane. The second piece sits on top of the first piece and brings the bed to a 45 (or so angle) from the 20 degrees." Again it is unclear whether this occurs on the other planes.

### **Help Wanted.**

I would appreciate any assistance from TTTG News readers.

In particular, I am looking for any sketches, dimensions, or photos, which might assist me in building a replica of a Towell Panel Plane.

To assist in my general research, I am also interested in readers' insights into the history of metal infill planes in general and the method of their construction.

In particular, I am seeking any information which might throw some light on who was the first to use a lever cap on a metal plane and when this might have occurred. I know from Mark and Janes Rees's work that a lever cap on a wooden plane was patented by Joseph Fenn in 1845, and that Nigel Lampert (and others) believe that Stewart Spiers is the most likely to have been the first to incorporate a lever cap on a metal plane sometime around 1850. But as Mark and Jane Rees point out, lever caps were not in common use until 1870.

I can be contacted via email at [mickdoherty@ozemail.com.au](mailto:mickdoherty@ozemail.com.au) and my postal address is: Mick Doherty, Hawker Gardens, 7/153 Murrانji Street Hawker, ACT 2614.

Thank you in anticipation Mick Doherty.

### **Mick Doherty's Project.**

Mick contacted the editor a year or so ago and asked if I knew of any articles on infill planes. Regular correspondence on this subject followed.

A recent article by Mick "The Elusive Robert Towell", in TATHS Newsletter 83 prompted the editor to ask Mick to write a longer article for News.

Despite being given very short notice Mick was good enough to produce the requested article in time for this newsletter.

A number of TTTG members are making replica infill planes to a high standard and if the logistics can be solved, a meeting of these makers would be stimulating. The Committee is optimistic that Mike will be able to visit Sydney during 2004 at a time coinciding with a TTTG General Meeting and will be a guest speaker.

Since members of both TTTG and HTPAA are actively engaged in research into this subject, any information on infill planes could be of use to Mike and other plane makers.

Nigel Lampert's "Through Much Tribulation: Stewart Spiers and the Planemakers of Ayr" is a standard reference. Contact Oliver Publications. P.O. Box 658. Pascoe Vale. Victoria 3044, phone (03) 9350 2242.

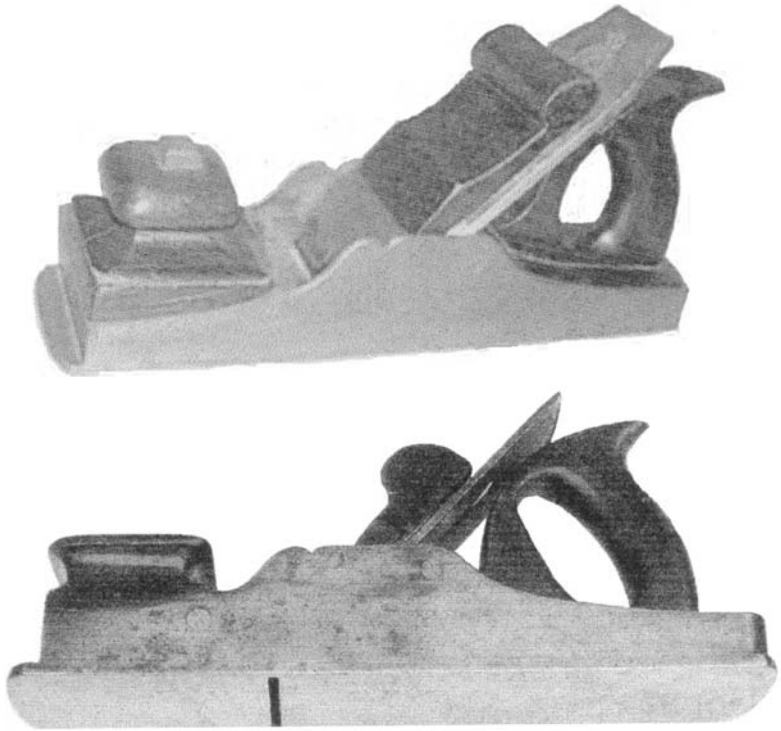


Fig. 1 –Panel Planes by Robert Towell owned by Messrs. Funnell and Swede.

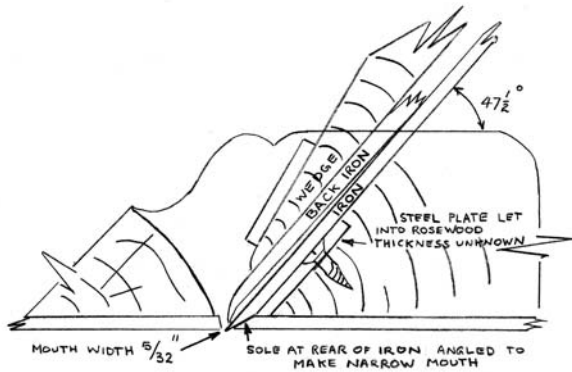
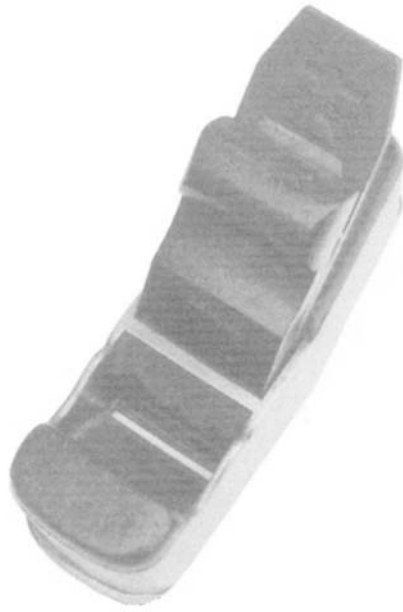
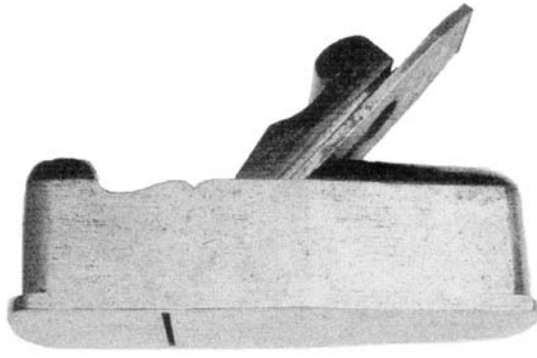


Fig.2 Cross Section of a Towell Plane after a sketch supplied by Mr. Funnell



**Fig. 3 A Towell Smoothing Plane with Tapering Sides**

## **Magnetic Pointer.**

Steve Flint.

I don't know if this is "on topic" but to me it is a hand tool.

### **More hidden history.**

On one of my more recent tool hunting expeditions I ventured into a scrap metal yard. I had visited this place several times before and this time I came prepared, with shifter, screwdrivers and torch. I find a torch a very handy tool to have when looking in old barns and sheds, and this yard had many a dark place that needed illuminating.

Now blackened by years of dirt, dust and grease with a lunch time from work that was about to expire I noticed the ends of some boxes under piles of junk, these boxes were army green and showed signs of age.

With some effort I removed fifty odd years of debris from off the top and a degree of excitement filled me. The boxes were about 1.5m long by 10cm wide and 12cm deep and were marked P.M.G.

By this time I had turned off my phone, lunch had passed best to be uncontactable. I opened a box; it contained a long magnetic tool about 1.4m long and a bunch of metal flag type plates of various sizes.

I remembered the movie The Battle Of Britain with the female air force personnel moving the plots around the map board, were these things the same tool?

Unable to help myself I purchased the lot after much haggling with the proprietor, unfortunately the fact that they were not all complete worked in my favour and a price was set.

Once the boxes were dusted off and secure within the confines of my workshop I performed a closer inspection. It is a simple tool; it has a chrome shaft with a Bakelite handle. A simple thumb slide operates a magnetic head by drawing the magnet inside, thus allowing the small metal plates to be moved around the board. There are four boxes of metal plates, three printed with various military insignia and a fourth box of blanks for making extra discs. On the handle is marked P.M.G Vic 1941 and they have various military numbers on the outside of the boxes.

Realizing that there might be some historical significance to the Items, I contacted the Australian War Memorial in Canberra with the offer of a donation for information.

The Items are plotting board pointers and markers and were used to plot coastal ship movements within sectors for coastal artillery, used in conjunction with observers and radar and then plotted onto the map board.

The Post Master General's Department (PMG) made a wide array of signals and other equipment during WW2 on contract. In those days, they ran extensive workshops for the manufacture and repair of communications equipment, so had the capacity to manufacture items for the armed services.

The donation has been accepted as they did not have one and I will bring one along to the TTTG meeting in February for those that are interested.



### A Typical TTTG Committee Meeting.



Occasionally I'm asked **"what goes on at the TTTG Committee meetings?"** My invariable response is to invite the curious TTTG member to attend a meeting. A few have taken up the offer. They in turn are questioned about the Committee. Any important TTTG Committee decisions are routinely reported in this newsletter. News readers may be interested in a description of a typical Committee Meeting. The following account has been provided by a high profile TTTG member but this prominent TTTG member has requested that his name not be revealed. Not that he fears reprisals but the "whistle blower" syndrome is a consideration. The editor also wishes to emphasise that the illustration reproduced above is not meant to be an accurate representation of a TTTG Committee meeting. Buckets have never been used for seating at any TTTG Committee meeting. Smoking may have been allowed but games of chance have never been permitted. Dress code is informal. The gentleman in the cap is not sitting on the Minute Book. It is hoped these candid comments will encourage your involvement in Committee.

## **A Typical TTTG Committee Meeting.**

There is a great deal of silent preparation before any TTTG Committee meeting.

### **The Agenda.**

An Agenda has to be produced and distributed. Usually the TTTG President produces the agenda. This varies from established “Rules and Procedures of Chairmanship”, a copy of which can be found in the TTTG Library, but it seems to work for us anyway. Usually Bob remembers to print the agenda a few days before the meeting.

There have been occasional problems with format and numbering but it would be incorrect to assume that the agendas are produced in haste. Sometimes the agendas are emailed to other Committee members; sometimes they are distributed at the meeting. What ever happens, the meetings are always Agenda driven.

### **Where we meet.**

TTTG Committee meetings are held at Ray’s workshop. These are secure business premises and strict entry procedures must be followed. Yelling out “who’s there, open up” from the driveway is discouraged. The approved means of requesting admission is to knock on the fly screen door at the top of the stairs.

The official TTTG password is confidential, being restricted to Committee members. In summer the environmentally sound air conditioning is very effective, however in winter it is necessary to close the large double doors. Numerous chairs are provided.

### **Refreshments.**

Before the Committee meeting Ray usually picks up a few refreshments. Only a few times has the member of the Committee who doesn’t drink been forced to go to the corner shop for milk and sugar. Most Committee members also bring along such light refreshments of sustaining beverages and crackers. Cups and glasses are “on site”.

### **Starting the Meeting.**

Some informal rituals precede the formal commencement of business. Chairs are taken down and dusted, work in hand moved and bottle openers and cork screws set on the table, or trestles or what ever flat surface is pressed into service. While waiting for “everyone to show” the early arrivals amuse themselves by having a look at what Ray’s got in the workshop this month. Meetings can’t commence without a quorum.

### **Fred’s arrival.**

In the TTTG Constitution the quorum is defined. But the rule of thumb quorum is “when Fred arrives”. Fred always brings his latest finds and these tools are eagerly discussed. This usually coincides with the arrival of the remaining Committee and at this point Bob distributes the Agenda, and makes a cup of tea.

### **Meeting declared open.**

With every one seated, getting stuck into the refreshments and having very animated conversations, the committee is called to order. The President usually chairs the meeting. This is a variation on normal procedure but as Bob’s Agenda may contain a few typos this seems to be a sensible way to conduct the meeting.

**Minutes read.**

The members come to order when it is proposed that the “Minutes be read and accepted”. The Secretary holds the official TTTG Minute Book. Sometimes Mike will bring this to the Committee meeting. The Committee doesn’t get bogged down in formality and the proposal is soon seconded and accepted. Quite a number of TTTG Committee members have been on Committees in other aspects of their lives and are skilled game players. This wide experience allows them to cut to the chase at TTTG Committee meetings and to avoid any unnecessary paper work.

**Business arising.**

Matters carried over from the previous Committee meeting are the next item on the Agenda. The crucial topic is always “have we got a speaker for the next meeting” Typically the Committee manages to resolve any short-term crisis which may emerge. Strangely it is often at this point that Henry bursts into uncontrollable laughter.

**Correspondence.**

Darcy is always ready for this Agenda item. The President and Secretary have to be alert as Darcy throws the mail onto the table. Letters have been known to fall onto the floor. Invariably there are cheques and invoices received. Some curious letters may also be in the mail. The great fear is to get a letter offering to donate a big machine.

**Treasurer’s report.**

Cheques make Clynt smile, invoices make him scowl. At this point Committee members are reverential, especially those requesting the signing of cheques. We are all in awe of Clynt’s ability to control TTTG’s money.

**General Business.**

By this time order is beginning to break up and the discussions can become free ranging. A few topics always are raised. Rick is concerned about the Library. Plastic boxes have replaced cardboard and the cataloguing is well advanced but we have too many books and need to find a permanent storage space. The tool collection continues to grow, what can we do to find a permanent home, will Peter’s wife tell him to move the TTTG Tool Chest? Problems are raised and temporary solutions proposed.

**The Other Stuff.**

These are the informal discussions. Disagreements between Bob and Ray about the usefulness of computers, John’s observations on second hand machines for sale on the internet, Fred and Henry comment on the old tool market. Everyone is having fun.

**The visitors.**

There are a few regular visitors to the Committee meetings. Hugh manages to put forward good ideas and never allows himself to be tricked into accepting a formal position on Committee. Guido once tried to follow the Agenda and showed great patience while waiting for the “right moment” to speak.

**Your Committee?**

All said and done a Committee is elected by the members.

The TTTG Committee is a bit informal, maybe too laid back, but it seems to function.

### Materials used to make tools.

A regular column about the materials used in making hand and machine tools.

#### Iron.

The terms cast iron, wrought iron and malleable iron often cause confusion. These terms are often used incorrectly even though they each have precise meaning. Royal Australian Naval College Engineering Notes 1943 has succinct definitions,

“**Iron**, in its different forms, is the most used of all metals. It exists naturally in various ores in large quantities in the earth’s crust and is easily obtainable. It varies much in character, according to the way in which it is treated after being extracted from its ores, and the proportion of other elements that it contains. The percentage of carbon is the factor that has the greatest effect on the properties of iron, together with the method by which iron is produced, determines its classification.”

“**Cast iron** contains about 2 per cent. to 4 per cent. carbon. This is the cheapest form in which iron can be employed in practical engineering, its usefulness being due to the ease with which it can be melted and castings made from it. Although of a brittle nature, and therefore unable to resist great shock, it is one of the strongest materials for resisting compression....”

“**Wrought iron** is practically a pure iron, containing up to 0.15 per cent. carbon. Its distinguishing characteristic is its fibrous structure. It can be easily welded because, when heated, it passes into a very pasty or plastic condition in which it can be easily worked or forged. It cannot be cast because of its high melting point, and when melted it is very sluggish and will not run satisfactorily.

Wrought iron is very tough, and has a very high resistance to shock.”

The welding process referred to is fire or forge welding.

Wrought iron cannot be hardened and in order to produce cutting edges wrought iron must be “steeled”. A thin layer of steel is fire welded onto wrought iron to form the cutting edge, the steel being hardened and tempered after welding.

The introduction of **mild steel** provided a cheaper substitute for wrought iron.

Mild steel is homogeneous in structure and can be given a very good surface finish.

The technology used to convert iron ore was the catalyst to the “take-off” in the industrial revolution and determined the development of hand and machine tools.

Charles Holtzapffel’s *Turning and Mechanical Manipulation Volume One (1843)* discusses the historical and contemporary methods used to produce pig and wrought iron, and the manufacture of steel.

The Further Reading List provides additional references.

## **Pig and Cast Iron.**

The following description of the manufacture of Pig Iron and Wrought Iron is derived from Chapter Ten in Charles Holtzapffel's *Turning and Mechanical Manipulation* Volume One (1843).

In Holtzapffel the terms *Wrought Iron* and *Malleable Iron* are interchangeable.

*Malleable Iron* should not be confused with *Malleable Cast Iron*.

The processes described predate the introduction of *Mild Steel*.

## **The Manufacture of PigIron.**

After extraction the iron ore was subjected to the process of calcining (roasting).

The iron-stone (raw-mine) was mixed with coal and thrown into heaps.

These heaps were ignited and allowed to burn themselves out, in three to four weeks.

This process could also be performed in kilns.

Roasting calcines the ore, after which the ore was said to be "torrified".

Smelting in England and Wales was generally performed with Coke.

The Coke was also prepared in Heaps or Kilns, usually in Kilns.

The Smelting Furnace required the introduction of large quantities of air.

Blowing engines blew this air through tuyeres. The flux used was limestone.

In some regions clay was added to the limestone flux.

The product of this smelting process was pig iron.

Pig iron could be further processed to form cast iron or wrought iron.

## **Cast Iron.**

Iron to be cast was remelted in a Foundry. The furnace used was called a Cupola. This is a type of refractory furnace.

Grey cast iron, Scotch iron, was used for castings.

Malleable cast iron was a later development.

Cast iron was "the" material of the industrial revolution.

Cast iron was used for everything from boats to bridges, from coffins to cannons.

*A future article will examine the various types of Cast Iron.*

Since ancient times "blooms" or "pigs" smelted from iron ore were refined under the hammer, or wrought, into malleable iron. This involved heating the pig iron in a charcoal furnace and continuously forging and reforging the heated metal.

The process continued well into the nineteenth century in parts of Europe.

## **The Manufacture of Wrought Iron.**

### **Puddling and Rolling.**

In 1793 and 94 Mr Cort obtained patents for the process of puddling and rolling iron. Cort's process made larger sections of wrought iron available at less cost than was possible by hammer working charcoal-refined malleable iron.

In Cort's process the crude cast iron was remelted in large quantities in a furnace called a chaffery, or refinery, blown with blast air. The metal was kept fluid for half an hour and then cast into a plate about four inches thick. This plate was purer and finer in grain than pig metal and was known as refined metal.

When the plate cooled it was broken up and, with lime, placed in the hearth of the puddling furnace. The puddling furnace was a refractory furnace without blast.

As the metal began to melt a workman revolved the metal with iron tools and threw ladles of water upon it from time to time. The metal appeared to ferment as if internal stresses were being released. At first the metal had a pasty appearance but soon this changed to a granulated form. As the molten metal conglomerated the workman broke it into large balls.

These balls were then shingled or worked under a massive helve or forge hammer.

The result was a bloom, or short rudely formed bar. The bloom was then raised to welding heat in a reheating furnace. This hot bloom was then reworked under the hammer or through grooved rollers or it was submitted to both processes. The result was an elongated rough bar. This was called No.1 bar.

The No.1 bars were cut into short pieces and again raised to welding heat. Piles of the reheated No.1 bars were passed through rollers to weld them together.

The resulting bars were called No. 2 bars. The process could be repeated to produce No. 3 bars. No. 3 iron was the purest form, known as white iron.

### **Charcoal Iron.**

A similar process was carried on with charcoal as the heat source. This produced a superior purer, and more expensive, wrought iron. This charcoal iron was left with ridges from the hammer and referred to as dented iron.

### **Rolling Wrought Iron.**

No. 2 and No.3 iron were hot rolled into flats and sections.

This made possible such diverse products as railway tracks, iron clad ships, piano-forte wrest plates and dovetailed wrought iron planes.

### **Wrought iron's properties.**

Cort's process deprived cast iron of its carbon, the original crystalline structure being transformed into a fibrous structure.

The presence of impurities, slag intrusions, meant wrought iron could not be given a high quality surface finish.

Wrought iron was divided into three principal varieties, red-short iron, cold-short iron and pure malleable iron.

Pure malleable iron could be converted into steel by the process called cementation.

## **Improvements in Wrought Iron Production.**

Cort's process reduced the cost of wrought iron while making large sizes and numerous sections economically viable.

However the quality of this wrought iron was dependent on the ore smelted.

English wrought iron was inferior to charcoal, "dented", iron.

Yet the British Isles had abundant iron ore, limestone and coal occurring in close geographic proximity.

Many "new" processes were developed to improve the quality of wrought iron made from local iron ore.

The drawing on the next page is of an improved process practiced at the Sheva Works, Kirkintilloch, Scotland in the 1840's. It is from The Magazine of Science, Volume V, edited by G Francis and published in 1844.

Mr William Neal Clay developed this production method.

The process reduced the number of operations and produced a superior wrought iron. However it was only a refinement of the Puddling Method and relied on mixing some imported pig iron with local iron ores.

Many other improvements had been made after Cort's initial breakthrough. However all were variations on Puddling. The common theme was a reduction in the number of processes involved and attempts to produce best quality wrought iron from British iron ore. The quality of wrought iron varied greatly among the various iron works.

The full potential of the iron ore and coal deposits of the British Isles was achieved with the invention of a process to make steel directly from pig iron.

The new method of conversion produced Mild Steel, a uniform product cheaper to make than wrought iron. Wrought iron had qualities not possessed by mild steel but the more uniform and less expensive material gradually displaced the older metal.

## **Further Reading List.**

Charles Holtzapffel Turning and Mechanical Manipulation. Volume One. 1843.

E G Semler, editor. Engineering Heritage. Volume Two. 1966.

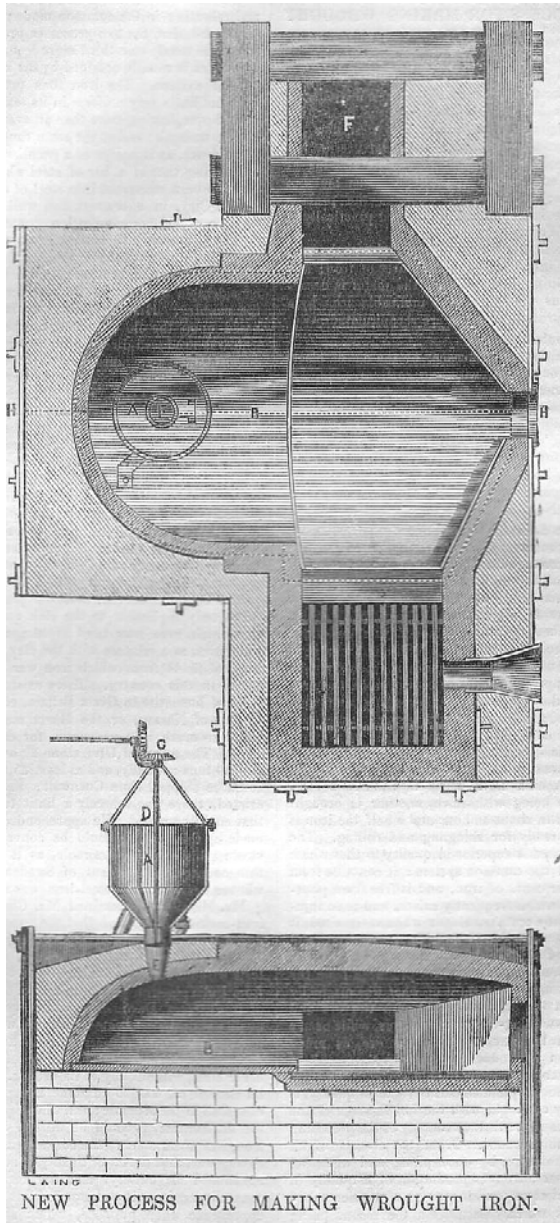
T K Derry & T I Williams. A Short History of Technology. 1960.

## **News 76**

In the next issue **Steel**.

Cast Steel, Blister Steel and Shear Steel will be defined

The Bessemer Process of making Mild Steel will be examined.



## **THE LEDGER**

Clynt Sheehy, the TTTG Treasurer, begins a regular News page.

### **The Bushfire Appeal.**

At the November Committee Meeting the receipts from the Canberra Bush Fire Appeal were reconciled.

In recognition of John and Priscilla McDonald's contribution to the study of traditional tools the following resolution was passed unanimously.

*John and Priscilla McDonald suffered a tragic loss in the 2003 Canberra Bush Fires.*

*The McDonald's tool and book collection was totally destroyed in these fires together with their home.*

*As an expression of their contribution to the study of traditional tools*

*The Traditional Tools Group will:*

- *Give John and Priscilla McDonald complimentary membership of TTTG up to and including 2007/08.*
- Give John and Priscilla McDonald a gift of \$500.*
- Offer John and Priscilla McDonald a Mathieson Star Mortising machine.*

### **New TTTG Members.**

The Treasurer, on behalf of the TTTG Committee,  
Welcomes the following new Members to The Traditional Tools Group :

**Phil Sticklen**

**Ken Turner**

**Debra Schleger**

**Bob Langdon**

### **The Financial Year**

The Australian financial year, as used by many financial institutions, extends from 1<sup>st</sup> July to 30<sup>th</sup> June.

For over over ten years, TTTG has based its annual membership subscriptions on the Australian financial year. The current financial year commenced on 1<sup>st</sup> July, 2003.

The members whose numbers are listed at the bottom of the adjacent OVERDUE SUBSCRIPTIONS NOTICE have not yet renewed their 2003-04 subscriptions. There are legal liability issues associated with non-financial members attending TTTG meetings. In addition, the receipt of subscriptions in dribs and drabs leads to significant extra work for the Hon. Treasurer. **Would those TTTG members listed please expedite their payment.** THANK YOU !

**TTTG SUBSCRIPTION RENEWAL NOTICE**

**2003 – 04 SUBSCRIPTIONS  
ARE OVERDUE**

**(TTTG Memberships are based on the financial year  
1<sup>st</sup> July to 30<sup>th</sup> June)**

**IF YOU HAVE NOT YET PAID, PLEASE FORWARD A CHEQUE  
FOR \*\$30 ( MADE OUT TO TTTG Inc.) TO :**

**The Treasurer  
TTTG Inc  
PO Box N240  
GROSVENOR PLACE  
SYDNEY NSW 1220**

\* If you live more than 50 km from Sydney or you are a pensioner, then you MAY CHOOSE TO PAY only \$22.50

**Please advise if you have CHANGED your address from that shown on your Newsletter address label.**

**It would be helpful if you would write your name and Membership Number on the back of your cheque. ( See Newsletter envelope address label for your Membership Number.)**

**Should you require a receipt, please enclose a stamped self-addressed envelope with your payment or see the Hon. Treasurer, Clynt Sheehy, at a TTTG meeting.**

**The Treasurer has NOT YET RECEIVED 2003-04 subscription payments from the following members (as at 15<sup>th</sup> January, 2004). Would these members please expedite their payment.**

|     |     |     |     |     |     |     |     |
|-----|-----|-----|-----|-----|-----|-----|-----|
| 7   | 116 | 188 | 221 | 237 | 257 | 271 | 281 |
| 36  | 133 | 195 | 222 | 244 | 259 | 273 | 282 |
| 75  | 156 | 206 | 223 | 245 | 267 | 274 | 283 |
| 87  | 168 | 211 | 228 | 249 | 269 | 277 | 287 |
| 114 | 180 | 214 | 231 | 256 | 270 | 280 | 288 |

## Library News.

Rick Mitchell

### Periodicals Received.

- Hand Tool Preservation Society of Western Australia. (HTPSWA).  
Newsletter.
- Hand Tool Preservation Association of Australia Inc. (HTPAA).  
Tool Chest/Sharp Edge Vol.15 No.3. Issue 69, August 2003.
- TATHS. Tools and Trades History Society.  
Newsletter 83 Winter 2003.  
Journal Vol. 14.  
Library Book Catalogue 2003.

## Directory.

- The Traditional Tools Group Inc. (TTTG). tttg.org.au  
P.O. Box 240 Grosvenor Place. Sydney N.S.W.1220.  
Enquires: Mike Williams phone 02 9144 6356  
Bob Crosbie e-mail : [r.crosbie@bigpond.com](mailto:r.crosbie@bigpond.com)
- Tools and Trades History Society. (TATHS)  
Membership Secretary: Jane Rees.  
Barrow Mead Cottage. Rush Hill, Bath. United Kingdom.  
BA2 2QP 01225 837031 (Office hours only).
- Hand Tool Preservation Association Australia. Inc. (HTPAA).  
P.O.Box 1163 Carlton. Victoria. 3053.
- Hand Tool Preservation Society of Western Australia. (HTPSWA).  
8 Belham Street, Bayswater. Western Australia

# HTPAA TOOL CONFERENCE

SATURDAY 20<sup>TH</sup> MARCH 2004

RYDGES HOTEL

701 Swanston Street

Melbourne

8. 30am-4. 30pm

Registration Information Page 37

The Conference will be followed on Sunday March 21<sup>st</sup> by

**The HTPAA Tool Sale**

At Glenferrie Primary School

80 Manningtree Road, Hawthorn

## **Book Review.**

### **The Pencil. A History of Design and Circumstance.**

Henry Petroski. Faber & Faber. London. Boston. 1989.

*“How do they get the lead into the pencil?”*

Do young children still ask this question? I can remember seeking the answer but in my case I had to work it out for myself. It does take a bit of observation and lateral thinking to find the correct solution.

If this was all that you wanted to know about pencils, then this book is an overkill but it is much, much more. It begins by exploring why things that are almost indispensable and in everyday use are often overlooked when we list our necessities of life. It uses the pencil to discuss the philosophy of engineering itself and the author’s contention that true engineering, involving intuition, lateral thought and plain common sense is much more than the commonly held view of being merely applied science.

Pencils began as luxury products made by joiners; their technology made pencils possible but hand planes and glue pots did not allow pencils to become readily available inexpensive necessities.

For this to happen a succession of “engineers” had to develop the right combination of materials, production techniques and distribution networks. How this evolved over three hundred years is the theme the author explores. The book explores the social history associated with the pencil and its antecedents including the importance of the Lake District in England in early pencil manufacture.

This no doubt all sounds dull and such a book could have the potential to displace chemical sedatives. But the author analyses the story of the pencil as an analogy for the entire engineering process. The result is a compelling narrative.

This book can be read on two levels. Superficially, the reader will gain a great deal of facts about pencils, their history and pencil production. At a deeper level, the reader will gain insights into how engineers think and how they are motivated.

‘The Pencil’ is both an important contribution to a much neglected area of technology and a fascinating study of the role that engineering plays in our society, both now and throughout history.

Bob Crosbie.

TINMEN'S MACHINES.

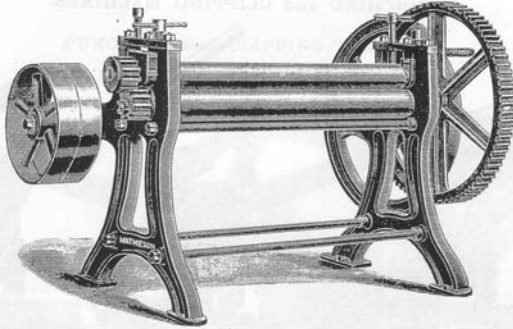
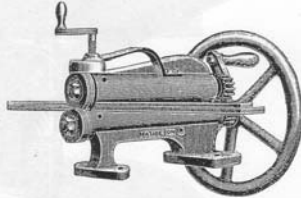
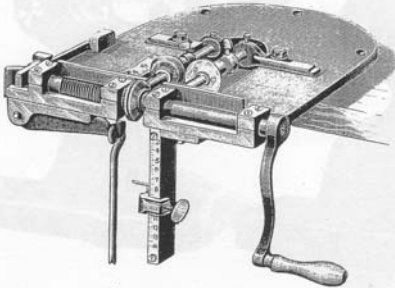


PLATE BENDING ROLLERS, for Hand or Power.  
Top Roller to Draw Out.

|                      |         |         |         |         |             |
|----------------------|---------|---------|---------|---------|-------------|
| No. ... ..           | 17      | 18      | 19      | 20      | 21          |
| Size of Rollers, ... | 48 x 3½ | 48 x 4  | 54 x 4½ | 60 x 4½ | 66 x 5 inch |
| Price, ... ..        | £36 0 0 | £40 0 0 | £48 0 0 | £54 0 0 | £59 0 0     |

SIZES NOT NAMED, QUOTED ON APPLICATION.

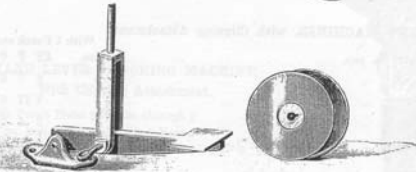


STRAIGHT CUTTING CIRCULAR SHEARS.

|                        |        |              |
|------------------------|--------|--------------|
| For Hand, ... No.      | 40     | 41           |
| To cut Strips 1 in. to | 12     | 18 in. broad |
| Price, ... ..          | £8 0 0 | £10 0 0      |

|                        |         |              |
|------------------------|---------|--------------|
| For Hand or Power, No. | 42      | 43           |
| To cut Strips 1 in. to | 24      | 36 in. broad |
| Price, ... ..          | £16 0 0 | £21 0 0      |

No. 40, 41 and 42 cut 16 W.G. thick. No. 43 cuts ½ in. thick.



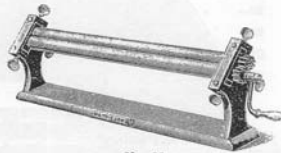
No. 35.

THE "RAPID" CIRCLE CUTTING MACHINE.

Will cut Circles from 3 to 14 inches diameter from Tinplates.

With 1 pair Discs, each 2½ and 5½ in. diameter, ... .. £3 10 0

Spare Discs—Small, 3/6; Large, 4/6 per pair. Spare Cutters, 10/ per pair.



No. 36.

TUBE FORMING ROLLERS.

1 Roller to come out.

20 in. long, 1 in. diameter, ... .. £3 10 0

Illustrated above is just one fascinating page from Alex. Mathieson & Sons' Illustrated Price List of Engineers & Blacksmiths' Tools &c which has been reprinted by Ken Turner. **Contact Ken on (03) 9878 2697 to order your copy.**

# HTPAA Tool Conference

Saturday 20<sup>th</sup> March, 2004  
Rydges Carlton, 701 Swanston Street, Melbourne

## *Application form*

Surname .....

Given Name .....

Address .....

.....

.....

Tel. Nos .....(H).....(B)

Fax No .....

*Accommodation: Please contact Hotels and Motels direct.*

Are you intending to bring tools for display?    yes     no

Will you be bringing your partner?                yes     no

Name of your partner.....

---

Make cheques payable to HTPAA

|                                |                  |      |
|--------------------------------|------------------|------|
| No of registrants.....         | \$50 each        | \$   |
| (includes entry to tool sale)  | (\$45 after Feb) |      |
| No of attendees at Dinner..... | \$45 each        | \$ _ |
|                                | Total            | \$ _ |

## Advertisements.

### RATES.

All **WANTED** and **FOR SALE** advertisements **are free.**

Quarter Page \$10 per issue.      \$50 per annum.

Half Page    \$15 per issue.      \$80 per annum.

Full Page    \$20 per issue.      \$100 per annum.

First placement is free.

### WANTED

- Heavy Firmer Chisels wanted by working carpenter.  
Square edge chisels all sizes 1" and above.  
Mick Dowling. Phone 03 93863481 or 0407 544338.  
[itshimselfthen@bigpond.com](mailto:itshimselfthen@bigpond.com)
  
- Any planes made by Jas. McLaren Melbourne, even a photo.  
Spiers or Mathieson Thumb, Chariot, and any Gunmetal Planes  
Jim Black. Phone 0351 825561.
  
- Australian made implement wrenches and spanners.  
Anything either marked as Australian Made or known to be so.  
Also ones from Railway workshops and other enterprises.  
George Radion. Phone 03 9557 1178,  
[radion@iprimus.com.au](mailto:radion@iprimus.com.au),

Compucel ABN 79295652356

### COMPUTERS & ACCESSORIES.

Notebooks custom configured to specific needs. Operating software etc.  
Hard drives, USB memory sticks, USB floppy drive kits, miniature optical  
mouse for notebooks, CD writers, external drive cases for hard drives etc.  
budget boxes.

Ray, member TTTG No.77      [anaray@netspace.net.au](mailto:anaray@netspace.net.au)  
Tel. 02 95699780 mob.0415361613

**Compuce ABN79295652356**



**Woodturning:** - Turned dolls, lidded boxes & bowls for folk art or decorating, or to customer's detail.

Turned table legs etc. Turning for restoration.

**Engineering:** - Repair, restoration & manufacture of metal parts.

**Welding:** - Electric, gas & TIG welding. Brazing & silver & soft soldering.

Stainless steel work.

Phone (02) 95699780 / 0415361613 P.O. box 12 Westgate NSW 2048.

Can mail order if possible.

Contact Ray, member TTTG

**Basic Blacksmithing Classes** will be taught in the historic

Eveliegh Locomotive Workshops, Redfern Sydney

Classes will commence on Wednesday February the 18th 2004 at 6pm .

The class shall be of three hours, and continue for ten consecutive

Wednesday nights for a total of thirty hours of tuition

The cost is \$660.00 including GST.

The course will be project based, no previous experience required, all materials supplied except safety glasses.

The course is limited to 8 students. Light refreshment is provided at 7.30pm.

The main area of instruction will be how to use and control the forge.

Hammer control will feature, as well as six representative examples of the seven basic techniques

- Drawing Down
- Upsetting
- Hot cutting
- Bending
- Twisting
- Punching Holes

Classic assembly methods will be used and some fitting gone into.

Class projects have included : A large floor standing candelabra, mirror frame, a forging hammer, scribes, ladles.

People interested in attending can call 02 93196190 and ask to speak to Guido for more information or email your enquiry to

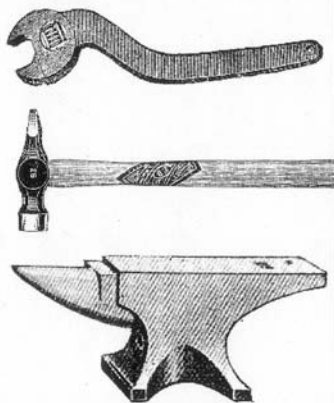
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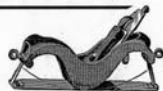
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