**Introduction**

The following notes were produced by Holtzapffel & Co; they are undated but were probably issued around 1920. They describe an ingenious way of using a standard ornamental turning lathe, with the addition of certain special equipment, to produce patterns similar to those made on a rose-engine.

The lathe headstock is set up with the spiral apparatus with its extension for surface spirals and the reciprocator. The eccentric chuck is mounted on the headstock in the horizontal plane and it rocks from side to side under control of the reciprocator. A special drilling head is mounted on the nosewheel of the chuck and driven from the overhead. The spiral apparatus is connected by a long drive shaft to the leadscrew of the slide-rest.

A special copy of the mandrel nose on a square stem is held in the toolbox of the slide-rest and the rectilinear chuck mounted on this. The work is mounted on the rectilinear chuck either alone or in combination with the dome chuck and/or the oblique chuck. As the slide-rest leadscrew is advanced, so the drill, oscillating up and down, cuts a waved line in the surface of the work.

This and many other papers in this book have been re-typed as the original typescripts, when reproduced in print, were difficult to read.
Introduction

The Rose Chuck enables rose engine work to be undertaken without the need for a rocking head stock or rocking, or sliding slide-rest. It has horizontally opposed slides pushed by springs such that the workpiece may oscillate from side to side under the control of a rosette. To avoid sudden stops and starts occasioned by the rubber slowing before and accelerating after passing over a crest on the rosette, it was found necessary to use the tangent screw to regulate the rotation speed of the chuck and, for this purpose, an Automatic Driving Apparatus was devised.

The Pumping Apparatus comprises a strong spring which pushes against a rosette, fixed on the tail-end of the traversing mandrel, against a follower, screwed into the back of the headstock casting, such that the workpiece is advanced towards the cutter, causing it to cut successively deeper and shallower. However, as the automatic driving apparatus could not be engaged when the mandrel was traversing, the Variable Drive was devised to impart a steady slow motion to the lathe in order to obtain a fine finish from a rotating cutter.

The following Notes on the Rose Chuck and Pumping Apparatus were published by Holtzapffel & Co., c.1892 and they describe the setting up and operation of Mr Budd’s Rose Chuck. There were two editions; the second included sections on Cutters and Cutting Frames and The Rose Chuck & the Spiral Apparatus. The two editions have been amalgamated here, causing some confusion with figure numbers.

There follows two extracts from ‘Engineering’ magazine volume XLI dated 25th June 1886 featuring the Rose Chuck as made by Holtzapffel & Co., and a further extract from the same magazine, volume LIV dated 19th August 1892.

Finally, there are two Letters Patent registered by Budd in 1885, which include detailed drawings of the Rose Chuck; and a further Patent for Silent Driving Gear for the Slide-rest registered in 1888.

The original typescripts were difficult to read so they have been re-typed for this book.
Introduction

The following notes are of unknown origin but believed to be part of an instruction handbook produced by Holtzapffel & Co, for buyers of their rare Rose Engines. A Plate Number is missing from the first page of the manuscript, but the text refers to a Plate numbered 15. It is therefore assumed that the original manuscript is a draft for a booklet for which the plate numbers had yet to be finalised. It is also clear that this is only part of what was intended to be a larger publication. It was Holtzapffels’ practice to have handbooks of this type produced in manuscript form when they were provided only to a small clientele where the cost of printing a small run would be prohibitive. This extract may have been either a draft or part of a master copy which would have been provided to a hand copyist for production of each individual handbook.

As the handwritten manuscript is difficult to read a typed copy of the text is also included.

A Straight Line/Eccentric Chuck combination made by John Bower
(photographs courtesy Lynn Woodwork Museum, New Zealand)
Part 1
Chapter 4

THE ROSETTE FORMING MACHINE

Introduction

This typescript is presumed to have been copied from a manuscript written by George William Budd and although undated is believed to have been written before 14th October 1897 when Budd adopted the surname of Holtzapffel-Budd. It describes the Rosette Forming Machine designed and made, largely from spare parts available around the workshop, by Charles Holtzapffel about 1840. It remained in constant use until the manufacturing business closed in 1927. For the convenience of readers the text has been re-typed.

The machine has been held in the London Science Museum since 1928. The monochrome photographs were provided by the Science Museum in 1952 when this typescript is thought to have been produced.

Holtzapffel & Co employed a numbering system to catalogue the shapes of their rosettes and these were illustrated in a booklet supplied to buyers of their Rose Cutting Frame. (The booklet is reproduced in Part 1. Chapter 11. below) together with computer simulations of Holtzapffel rosette profiles, kindly provided by Bill Ooms, and notes by the Compiler about M. de la Condamine’s Rosette Designing Instrument. For further information see L’Art duTourner 2nd Edition by C.Plumier (translated into English by Dr. Paul Ferraglio) and the Bulletin of the Society of Ornamental Turners (edition #52 page 73) where Dr. Ferraglio explains the most important parts of a presentation by M. de la Condamine to the Royal Academy of Science, Paris, 1734, in which de la Condamine considered ‘The Relationship between Rosettes and the Patterns they can produce. This is a most useful paper as it gives practical advice on how to take a small pattern, such as the outline of a human head, and generate from it a larger rosette that will reproduce on the work-piece the pattern in its original size.
Introduction  John Thomas Bower was born in Kirriemuir, near Forfar in Scotland around 1795-6. He moved eventually to London where he conducted his business as engine-lathe and toolmaker, at 13 King Street, Clerkenwell. He was one of the most skilful makers of ornamental turning lathes and rose engines both for amateurs and for the jewellery and other engine-turning trades, and his rose engines and combined rose-engine/ornamental-turning lathes are among the finest ever made. Each of his O.T. & R.E. lathes is different but the characteristics of his work are easily recognisable. John Bower died on 25th August 1849.

He was employed from time to time to convert Holtzapffel O.T. Lathes into Rose Engines; one of these, No.930, is stored by the Museum of Transport in Glasgow. Holtzapffel Rose Engine Lathe No.1110, a full-blown 12” Rose Engine, was purchased originally by the Earl of Harborough on 15th December 1831, and is listed in Holtzapffel’s register as being sold for £330. It appears that John Bower may have been the second owner of this lathe and he is reported to have said that the total cost of the outfit with all its many accessories amounted to £1500 and, when it came into his possession, it had with it almost every contrivance which an amateur could possibly desire; and a great deal besides. It included two Geometric Chucks and a Medallion-copying device. It is speculated that John Bower may have been inspired by this lathe to make what is possibly his finest creation, the superb Rose Engine & O.T. Combination Lathe, owned by the Lynn Woodwork Museum in New Zealand.

Bower made several O.T/Rose-Engine-Combination-Lathes, some of which are shown in the following pages. Each one is different but Bower’s inimitable style is obvious in all of them. Jno. Muckle made lathes of markedly similar design c.1830 and the Compiler suspects that Bower and Muckle may have worked together at some time. John Bower is believed to be the inventor of the ‘single rosette carrier’ attachment for fitting to the tail of the mandrel of an ornamental turning lathe. James Munro adopted Bower’s design for his ‘single rosette’ rose engine and Henry Smith Frost used this design for the later Rose Engine Conversions he carried out on Holtzapffel lathes.
Part 1

Chapter 6

CHAPLIN’S ROCKING SLIDE-REST

Introduction:


Although Chaplin claimed this as a new invention it appears, perhaps unconsciously, to have been based on one of several machines invented many years earlier. A similar apparatus was described in Manuel du Tourneur (1816), a slide-rest following this principle (shown below) was made by W. J. Evans around 1870 for what was possibly his most comprehensive lathe, No. 1217, and another was made, presumably by Holtzapffel & Co., for the Rev. C.C Ellison’s lathe No. 1911.

The Rev. C. C. Ellison demonstrated the advantage of a rocking spherical slide-rest over the rocking headstock; namely, that it could produce a regular series of patterns on a curve, whereas the patterns produced by a rocking headstock change because the effect of the rocking action gradually increases as the slide-rest moves around the curve towards the lathe axis.

Chaplin’s treatise is followed by pictures of a miniature Rocking Slide-rest lathe.

A NEW APPARATUS FOR THE EXECUTION OF TRUE ROSE ENGINE TURNING ON THE ORDINARY ORNAMENTAL LATHE

C. H. CHAPLIN

1933

Rocking Slide-Rest made by W. J. Evans for lathe No. 1217

(photograph courtesy of a previous owner)
Part 1  PUDSEY-DAWSON’S GEOMETRIC SLIDE-REST

Chapter 7

Introduction

Richard Pudsey-Dawson’s Geometric Slide-Rest has been well described in the book: ‘Ornamental Turning’ by J. H. Evans. It comprises an ornamental slide-rest with an additional slide, parallel to and sitting on top of the main slide; this extra slide has a leadscrew of 10 t.p.i. And is used to set the cutter at the desired radius from centre. In place of the normal leadscrew, the main slide has a spring, that pulls its carriage towards the operator; there is an attachment that clamps over the end of the main slide to hold a cam or template; a steel arm fixed to the main-slide carriage bears a rubbing wheel that is held, by the pressure of the spring, against the cam so that, as the cam is rotated, the sprung slide oscillates towards and away from centre. The cam-holder is joined by a shaft (made flexible by universal joints) to the gear-train of the spiral apparatus which is so arranged that the cam will rotate an exact number of turns to one turn of the lathe mandrel.

One of the most popular of the rose-engine patterns is made by the rosette described under Holtzapfel’s numbering system as ‘F4’. This rosette was formed by a the cutter following a heart-shaped cam rotated four times to one rotation of the rosette blank. Pudsey Dawson’s apparatus includes a heart-shaped cam for this purpose; and here is the great advantage of this slide-rest: by changing the ratio of the gear-train, this one cam may do the work of several rosettes: F3, F4, F5, F6, F8, etc. Cams of several other shapes were provided, including: eccentric circle, ellipse, etc., and they are so easy to make that their variety is constrained only by the user’s imagination. The only disadvantage of this machine is that it does not simulate the pumping action of a rose engine; however, this could be arranged without too much difficulty by adapting the drive to operate at any angle up to 90° from its normal position across the bed; at around 45° it would simulate both the rocking and pumping motions simultaneously.

Pudsey-Dawson took out Letters Patent for his invention and these are copied here to assist the reader in understanding the apparatus and, perhaps, to make it. Pudsey-Dawson made at least one of these slide-rests himself; others were made under his patent by W.J.Evans and later by his son, J.H.Evans. There are more photographs at the end of this Chapter and an extract from English Mechanics magazine, December 1871, describing this apparatus.
Introduction  This is an article from the ‘Model Engineer’ magazine, volume 65 dated 24th December 1931 describing a Geometric Slide-rest exhibited at the recent Model Engineers Exhibition by the maker, Granville Morton Grace, B.A., BSc. It is followed by an undated treatise on the instrument written by Grace himself. It is believed he made five of these rests and no two appear to be exactly the same; some of the different features may be seen in the photographs.

G.M. Grace was the brother of Rev. Gilbert Allan Grace, the author of ‘The Art and Craft of Ornamental Turning’ and the compiler of a limited edition book of photographs entitled ‘Ornamental Turning Design’. Most of these photographs are reproduced in Part 4, Chapter 4, and the remainder are scattered around as space fillers and the reader may find them by consulting the Index.

A fine Grace Geometric Slide-rest in fitted mahogany chest. Note the two cams on the rear of the shaft at the left: the front cam is followed by a lever, with the facility of amplitude adjustment, which pulls the cutter from right to left against the resistance of the long ‘ribbon’ spring across the front of the rest; the rear cam is a ‘swash plate’ that is followed by a lever that pulls the cutter away from the work against the resistance of the coil-spring on the central, cutting-frame-shaft. These two movements can be effected simultaneously, simulating both ‘rocking’ and ‘pumping’ motions, unlike Pudsey-Dawson’s invention which had no ‘pumping’ action. The drive is connected to the spiral apparatus through one of a pair of bevel gears so the slide-rest may be mounted either across the bed for surface patterns or parallel for cylinder work.
Introduction

Following the success of Pudsey-Dawson’s invention, George Birch of Manchester introduced an improved version of the apparatus which he patented in 1891. This chapter includes the Letters Patent with drawings. It also includes photographs of a simpler form of the device on Mc Nab’s Birch lathe No.562.

Birch’s adaptation of the Geometric Slide-rest. This machine was devised to fit onto Birch’s twin mandrel lathe. It has a drive-shaft running along the back of the lathe with either one or two cam-holders mounted on the back end of the lathe saddle and pivoting rods for pushing the sprung slide at whatever angle it is set in relation to the lathe axis.

Both mandrels are driven through a gear train so that, while the front mandrel rotates once, the back completes the chosen number of revolutions. The back mandrel drives a splined shaft on which is mounted a rosette, template or cam of large amplitude. The spline allows the lathe saddle with its rocking arms to be moved nearer to, or further away from the headstock. Rubbers follow the profiles of the rosettes causing the rocking arms to rock; these arms each comprise a slide with a leadscrew, the nut of which pivots on a pillar fixed to the back of the lathe saddle; it has a rubber at the upper end and a pushing arm at the lower end. By turning the rocking arm leadscrew, to increase or decrease the distance between the rubber and the pivot, the upper end of the arm can be made the same length as, or longer than the lower end, thus determining the amplitude of movement. The pushing arms are telescopic; one is connected to the sprung slide of the geometric slide-rest and its length may be adjusted and fixed to suit any radius of the slide. The socket of the slide may be released to swivel as well as slide; then the second pushing arm may be connected and the pattern influenced by both rosettes simultaneously; or the slide may be set to an angle and a pushing arm connected to a crank to give a ‘pumping’ effect.
Introduction

This is an apparatus for producing turned solids, the outlines of which are the curves, known as Lissajou’s, formed by the combination of two simple harmonic motions at right angles to one another.

In it the cutting tool is given the combined motion and so cuts the curves directly on the revolving work. The work is mounted on an ordinary ornamental lathe headstock, and a bracket bolted to the end of the bed carries a short transverse shaft, the front end of which has a crank with a pin adjustable radially from 0 to 2.5 inches. The crank pin engages with a hole in a block that slides in a vertical slot formed in a gun-metal frame, to which is bolted a long horizontal steel bar which is thus moved backwards and forwards with a simple harmonic action as the crank rotates. The crank shaft is driven through bevel and spur gearing from an upper shaft, which is driven by hand. The ratio of the speeds of these two shafts can be varied by using wheels of different sizes.

A compound slide rest is fitted to the bed and for this class of work the saddle is detached from the leading screw nut so that it can slide independently. The tool-holder slides in transverse guides on the saddle, and has a vertical slot and block adjustably attached to it, with which engages a crank pin fitted to a short shaft mounted in bearings on the saddle. This shaft is driven by a universally-jointed square shaft which passes through the square hole of the upper shaft on the left-hand bracket, so that the tool-holder is caused to move transversely with a simple harmonic motion at the same time that the saddle itself is moved by being clamped to the long bar driven by the main crank. The transverse crank is adjustable in length, and it can be clamped in any angular position relative to its driving shaft, and thus to the main crank. The tool can be set to the required depth by a screw and stop. The two harmonic motions may thus be of any relative amplitude, speed and phase.

The outline of the work is formed by one half of a double-looped curve, and to produce it the main crank must be turned backwards and forwards over one half of its circle only. The example shown in the lathe is formed of two motions having amplitudes of 3 in and 5 in, a speed ratio of 1 2, and a phase angle of 60°.

Following the death of H.C. Robinson the lathe was presented to the Science Museum of London by the executors.

This notice and the following photographs are reproduced by courtesy of the Science Museum of London.
THE ROSE CUTTING FRAME
(and the miniature high speed cutter)

Chapter 11

Introduction

The small booklet reproduced on the following pages was supplied with the Rose Cutting Frame.

Reproduced here, it shows the numbering system employed by Holtzapffel & Co., to catalogue the shapes of their rosettes. Examples of the patterns possible with each rosette are followed by computer simulations kindly provided by Bill Ooms of Arizona and notes by the Compiler about M. de la Condamine’s Rosette Designing Instrument.

As originally designed, the Rose Cutting Frame is of limited use because it can only produce patterns with a fixed tool and it is insufficiently robust to do much more than scratch the surface of the work.

J.H. Evans, observing this disadvantage, designed a series of miniature cutting heads, each rotating on a shank that fits into the tool box of the instrument and one of these is driven at speed from the overhead. The miniature heads made by Evans comprised an eccentric cutter, an internal cutter, a drilling spindle and a stylus.

Evans seems not to have designed a Horizontal Cutting Head; but this deficiency was remedied recently by Fred Armbruster of Maine, USA., who devised and made the miniature Universal Cutting Head shown here.

This miniature Cutter turns the Rose Cutting Frame into a small but very effective rose-engine which is capable of work beyond the scope of all but the most sophisticated trade rose-engines which have apparatus for ornamenting any point on a curved surface; such as on the ornamented eggs made by Fabergé. This type of work is made possible on the ordinary ornamental turning lathe by the Miniature Universal Cutting Head in conjunction with either the Spherical or the Elliptical Slide-Rest.

J.H. Evans also designed a simplified type of Rose Cutting Frame (see the final page of this Chapter) which follows the principles of the Pudsey-Dawson Geometric Slide-Rest but the head of the cutting frame comprises a horizontal slide with a spring which presses a rubber against a rotating cam, thus avoiding the great expense of a dedicated slide-rest with a sprung slide.
**Part 1  CHILD’S UNIVERSAL ROSETTE**

**Chapter 12**

**Introduction:** This article is in the form of a letter from ‘R’ of Halifax to the Mechanics Magazine, Museum Register, Journal and Gazette and published by them on 28th June 1834. It describes a mechanism invented by a Mr. Child, comprising a fixed headstock with a universal rosette and a rocking slide-rest. The rosette comprises a disc with two deep grooves on its edge and the spaces within the grooves may be bridged by pins located in rows of indexed holes (giving the same effect as would a pair of identical division plates with a spacer between them with the pins inserted through matching holes). The pins may be spaced closely or widely and at varying radii from the centre. A roller rubber or a curved rubber, inserted in one of the grooves, follows from one pin to the next, causing the slide-rest to rock to a greater or lesser degree as governed by the spacing of the pins. An infinite variety of shapes may be formed by planned or random changes of the positions of the pins.

The poor quality of the original print necessitated a typed copy being provided to assist the reader. Some parts of the figures and some measurements were so indistinct as to be impossible to decipher and these have been estimated.

This drawing was made by the late Alan Campbell and published in S.O.T. Bulletin #34. Alan owned a headstock constructed in the reverse manner to the one in the Mechanics Magazine article, in that the headstock rocks between fixed arms and the slide-rest is fixed.
MASSA’S UNIVERSAL LATHE

Chapter 13

Extracts from old magazines are difficult to read, so for the convenience of readers many have been re-typed.

Introduction

In 1887 F. N. Massa of New Jersey, USA, used the Birch variation of Pudsey-Dawson’s invention to make what he described as a Universal Lathe. This versatile lathe is described in the following extracts from English Mechanic magazine of that time.

English Mechanics 18th
November 1887
issue 1182 page 280 Ref. 28120
MASSA’S UNIVERSAL LATHE

During the past three years the writer, debarred from business pursuits by broken health, has occupied his time in constructing some additions, and making alterations to a Holtzapffel ornamental lathe. The lathe had the unusual feature of “pillars” and a “yoke” to receive end thrust, the “yoke” swinging off when mandrel traversed. The changes were made with very little interference with existing functions. The only metal removed was at edges of bed, where angles of 60° were planed, small rebates inside bed to clamp the heads, and rounding the square holes in ends of bed, to place the guide screw centrally. The heads were raised enough to use the 5 in. slide-rest on the new saddle, but finally new metal working spherical and ornamenting rests were made, with special features to suit the new conditions. A full-length, light bed was put at back, parallel, lower, and 10 in. from centres, with traversing mandrel and plain poppet. In front of main bed is the rack, along which the saddle is moved by an annular wheel and pinion and two more wheels; on the rack is a steel scale for quick adjustment. The guide screw is partly covered; it has a split nut, in vertical slides, worked by eccentric cam, as is usual. The screw is secured at the left only. Inside of the leg frames are inlaid in contact with ends of bed, iron plates with bosses passing through to the leg surfaces. The right-hand boss is bored to receive the screw shaft, which passes through, and has a handle fitted on the end. The left boss is bored out much

(Continues)
Introduction:

Alfred Edward Beddow’s Apparatus is well-described in the book ‘Turning Lathes’ by Lukin. However, Beddow took out Letters of Patent on his invention and a copy is provided here for the guidance of any reader who may wish to make a similar apparatus. The drawings, as reproduced, are not to scale.
Part 1  THE KINOGRAPH, THE CYCLOIDO-TROPE AND OTHER MACHINES

Chapter 15

Introduction:
These machines have the common ability of making complex patterns by mechanisms that use templates, levers, gearing or combinations of these. **Cunningham’s Kinograph** is the main attraction because it is a form of rose engine, the advertisement for his fretsaw is included because the Kinograph was adapted to sit on this machine. Next comes **Cunningham’s Carving and Engraving Machine** which, from the description seems to be quite versatile. The **Cycloidotrope**, the Instrument for Drawing Cycloids, the **Compound Pendulum** and the **Wondergraph** are merely drawing instruments but their mechanisms are interesting and they are included here in the hope that they may stimulate ideas for ornamental turning applications.
MECHANISM FOR TRANSPOSING THE ROSETTE PROFILE

The following information is taken from a catalogue of Engine Turning Machines by Gudel of Switzerland and was found with a machine dating from the 1940’s.

The rosette barrel may be disengaged from the Mandrel (described on diagram 1 as Axle I) so as to revolve freely. The Driving Pulley, A1, is firmly bound to the rosette barrel, A; a toothed wheel, D, is fixed onto Axle I; the Arm, R, is fixed onto Axle II; a toothed wheel, E, is mounted on Driving Pulley, A1, and rotates around toothed wheel, D; a template, S, is mounted on toothed wheel, E, and presses against the freely revolving wheel on the Arm, R, which is under tension of a spring, marked ‘10’ on the diagram and fixed to Driving Pulley, A.

Thus, if template, S, be a plain circle, there will be no effect. However, if template, S, be an eccentric circle, as it revolves it will push the Arm, R, against spring pressure and then release it, causing the Mandrel, Axle I, to accelerate and then decelerate in relation to the Barrel, Axle II. Different shaped templates will give different variations to the rosette profile; the scope being almost endless.

Diagram 1.
Part 1  
Chapter 17  
HOLTZAPFFEL & Co’s  
JOURNAL EXTRACT

Introduction
An extract from Holtzapffel & Co’s Journal of 1893 donated to the Guildhall Library, City of London, by the Worshipful Company of Turners, copied with the kind permission of both parties by Richard Boughton and reproduced in printed form by the Compiler.

This manuscript includes a useful description of the components of the Rose Chuck, the Automatic Driving Gear and Segment Stop Apparatus and the Automatic Counting Index. It also gives some indication of the relative prices of some of Holzapffel & Co’s merchandise at that date.

GUILDHALL LIBRARY, CITY OF LONDON  
MS.9475A

F.C.Hunter Esq.,  
Dr to  
Messrs Holtzapffel & Co.  
64 Charing Cross Road  S W

1893
Jan 5  To a 36 inch Mahogany Joiners Tool Chest of H & Co’s Pattern with three sliding trays the upper one divided to contain selections of nails & screws, the second divided in the center, & the lowest plain, and a till to contain saws, fitted with a Bramah lock supplied by Messrs Medes.  
£ 14. – 0. – 0.

6  Making to your instructions two gunmetal pulleys with 3 speed grooves each 9½ ins diameter & bored out to run on a 1½ in shaft, with a square headed set screw countersunk in each.  
£ 3. – 15. – 0.

10  A bottle of Anti-Corrosive Oil & postage  
3. – 0.