

The New Organs of William Drake

**Their relation to the Historic English Organ
in respect to
Mechanical Design**

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INTRODUCTION

Stephen Bicknell, in his book *"The History of the English Organ"* says, that during the Victorian era "England emerged as perhaps the preeminent organ building nation in the world." Although often ignored in histories of the European organ of the 19th century, this was a time of profound commercial and artistic success. Organ factories employing several hundred workers were not unusual, and their vast output reached every part of Great Britain, as well as many countries overseas. The organs produced were of high quality, and often of monumental size. Almost all Churches and cathedrals with old-style English organs replaced them during the 19th century, allowing builders an unprecedented opportunity for business. Profiting from this trend were the firms of **Hill & Son, Henry Willis, Gray & Davison, Harrison & Harrison, Walker**, and many others. From among these, Henry Willis emerged as the greatest of the Victorian organ builders.

The new organs that are designed and built at William Drake Limited are inspired by design features from the classical English historical organ. This firm is however looking also towards the Victorian period for inspiration. The instruments are made using traditional methods, and from traditional materials, but not necessarily an exact copy of any existing organ. This essay describes and compares Historical English Organs with William Drake's Limited instruments and also contains an element, in majority photographs, which documents my eight months of employment with William Drake Ltd. William Drake Ltd also build new organs in an historically inspired chamber-style. As example is a newly built and commissioned in early 2017, a new chamber organ of the Westminster Abbey Song School, at which construction, also I had the opportunity and pleasure to work.

Mechanical Design

of Historic English Organs (period 1735-1850)

in New Organs of William Drake Limited.

KEY ACTION (TRACKER ACTION):

The term "*tracker action*" is commonly used to designate the purely mechanical action, formed of trackers, stickers, levers, rollers, etc., which connects the manual and pedal keyboards with the pallets of the wind-chests of the organ; by means of which, on the depression of the keys by hands or feet of the organist, the pipe-work is made to speak. When well-built, mechanical actions are very responsive and allow the organist to control the attack and release of the pipes with great precision. Because the degree of responsiveness is dependent in part upon the length of the tracker run, with a short run being more responsive than a long one.

In the works of the old organ-builders and in the Historic English Organ, the tracker action was the only one used, and, indeed, the only one known.

The tracker action remained in its primitive or simple state until the introduction of the pneumatic lever (Barker lever), in a practical form, in the year 1841. This introduction materially modified the action and lightened the touch of the organ. Some old tracker actions were somewhat clumsy and sluggish affairs, requiring a considerable pressure on the keyboards; and it was only when modern ingenuity and mechanical skill were brought to bear on their construction that they became at all satisfactory.

Under the most favourable conditions, the simple tracker action is suitable for organs up to a size of about 50 stops: for them, however, it is, when properly made and accurately adjusted, the best of all actions. Before considering the tracker action in its complete form, it is desirable to describe in details its component parts:

THE TRACKERS, STICKERS, BACKFALLS, SQUARES and ROLLERS.

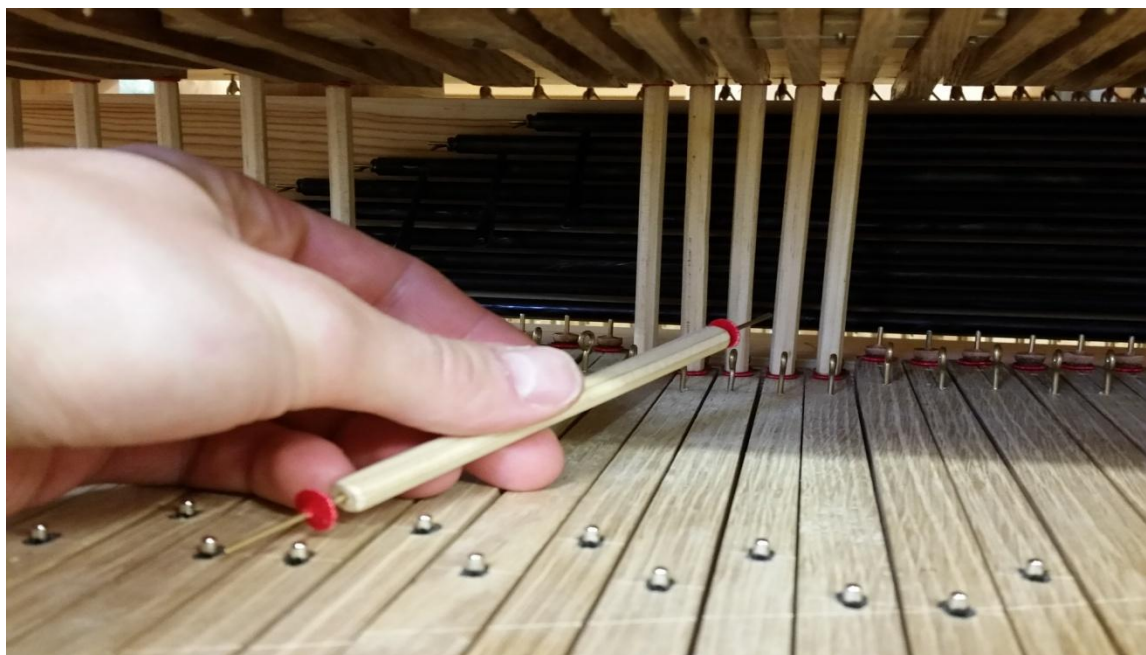
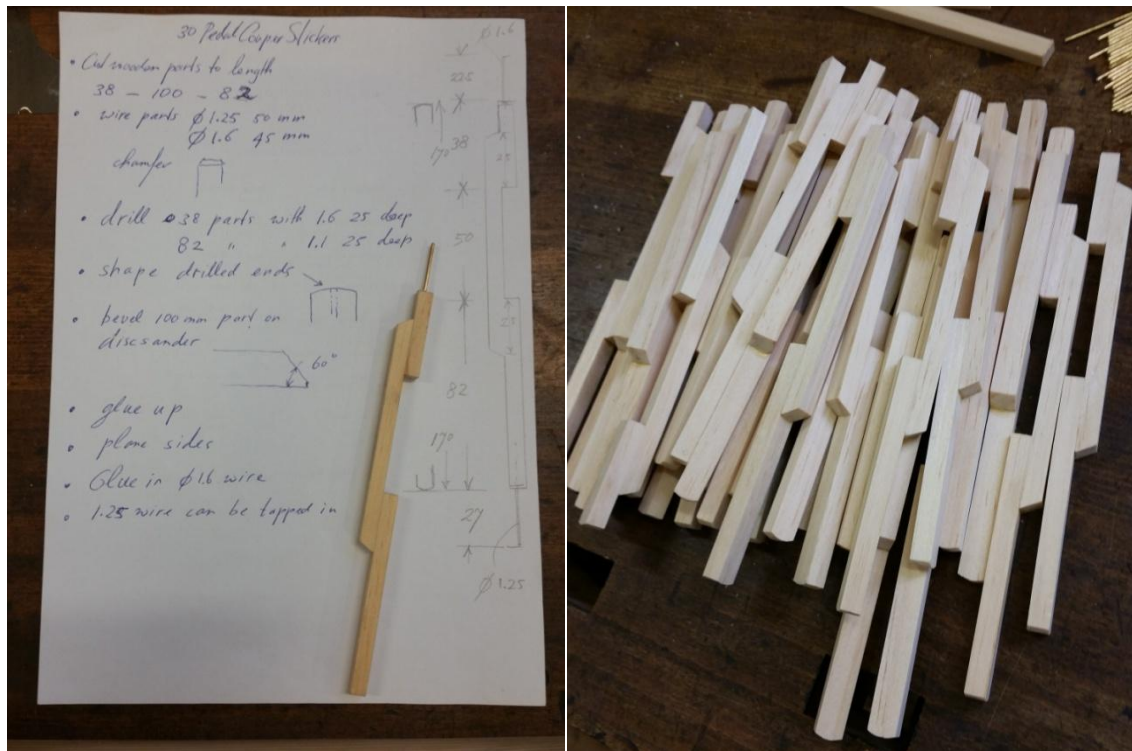
1. **TRACKERS**- are those parts of an action, which are invariably employed where a pulling motion obtains. They are slender strips of some light, straight grained wood, preferably clear white pine, oblong, round or square in transverse section. The oblong strips are properly used in vertical positions, while the round or square trackers are best adapted for horizontal and oblique positions.



Oblong-shape trackers prepared by me, action of Westminster Abbey Song School organ.

Flat trackers, as in pictures above, are readily made by being separated with a cutting-gauge from the edge of a white pine board, previously dressed to the standard thickness. They are cut with a fine circular saw from the edge of a plank, dressed to the required width, their sides having a shaving planed from them so as to remove the marks of the saw and leave them the standard thickness. When a tracker has been cut to the proper length to occupy its place in the action, it has its ends provided with a ready means of attaching it to the other parts of the action. One end may have a hook and the other end a threaded wire with round thick-leather button, for latter permitting adjustment in the action.

2. **STICKERS**- are those parts of a mechanical action which are employed to convey a pushing motion between two points in an action that are located a short distance apart. While the above-described trackers can, with their pulling motion, be carried to a considerable length, the stickers which are liable to bend or spring under a sudden push, cannot well be made beyond ten or twelve inches in length. When required of a length liable to spring or bend they must be made to pass through a register, at the risk of impairing the touch by friction. Stickers may be made of bay-wood or straight-grained white pine or spruce. They may be made round, square or oblong, in transverse section.





Four pictures above- the round and square stickers made by me in the William Drake Ltd workshop for the new Chamber Organ in a English Historical Style.

A sticker is held in position in an action by passing through a register at one end, and having a wire fixed at the other; or by having a plain pin or tapped-wire at each end (as round stickers above), or a plain pin at one end and a tapped-wire at the other. Stickers that rest against the tails of manual keys (a very common position) need only have rounded bottom ends, being held in position, a short distance above the key tails, by a horizontal register, and kept from falling, when the keys are removed, by small wire pins driven through them just above the register. In old organs, this is quite often a glued on piece of leather.

3. **BACKFALLS-** are those portion of the tracker action which are employed to convey a motion a moderate distance, and, at the same time to reverse its direction, hence their name- their back ends falling when their front ends and raised. Backfalls are strips of perfectly seasoned straight-grained wood, preferably light bay-wood. Their length varies, according to circumstances, from a few inches to about 2 feet. In the case of long backfalls, care must be taken to select the lightest wood that will not be liable to warp. Backfalls are usually supported by a beam of wood, across one face of which deep grooves are cut for their reception, and in which they are held in position by the wire passing through their central, bushed holes. The beam which is commonly called the "backfall-beam", should be sufficiently large to remain absolutely rigid under the force of the action. Sufficient depth is necessary because the beam is considerably reduced in this direction by the grooves cut for the reception of the backfalls.



Two new backfalls are connected by the square stickers, while the keyboard tails are connected by rounder stickers with third backfall.



Original double backfall by Richard Bridge organ from 1735. The Christ Church Spitalfields, London.

Different kinds of wood may be used with advantage; for instance the portion to be grooved may be of close-grained oak or mahogany and the other portion of straight-grained white pine. When properly made, this action is both light and silent.

4. **SQUARES**- The bent lever is largely used in tracker actions, in the form of the useful appliances called squares. Squares are commonly employed where an immediate change of direction is required in a tracker movement.; or from a vertical keyboard movement to a horizontal tracker one. Squares are formed of wood or metal, and vary in size according the circumstances. Squares made of wood when placed parallel to each other and close together, are commonly mounted in a grooved beam, in the manner already described for parallel backfalls. In this case the fulcrum holes are bushed with cloth, and the squares are carried on a long wire of phosphor-bronze, let into a small groove run in the beam, and held in place by wire staples. Bent levers, with their arms placed at an acute or an obtuse angle, may be constructed either of wood or metal in a similar manner to the squares above described. These are usually employed in draw-stop actions, or for some special oblique movement.



Westminster Abbey Song School Organ- pedals tracker action with squares.

5. ROLLER- is that part of an organ which is introduced for the purpose of carrying, in a parallel direction, a vertical or horizontal motion to a point more or less distant from the starting point of the motion. Rollers are largely used in the tracker action which I describe in this essay's chapter, being the most convenient means of spreading the necessarily narrow movement from the keyboards to the wider stretch of the wind-chest mechanism. A roller is, strictly considered, a lever, the fulcrum of which is prolonged in the form of a pivoted bar or rod; and the arms of which are attached to the fulcrum bar at or near its opposite extremities. The two arms may project from the same side of the bar, when their motion will be similar and parallel, and the roller will represent a lever of the second order. This is the form most frequently introduced in tracker actions.



New metal-roller, which made in William Drake's Ltd workshop.

The arms may occupy positions on opposite sides of the bar, when their motion will be contrary and parallel, and the roller will represent a lever of the first order. This form is used when one arm of the roller is moved by a sticker while the other moves a tracker; or when a contrary motion has to be carried some distance between two trackers.



Old wooden-roller during restoration in the workshop.



On the left hand side- I was repairing the rollers in old English Organ-Thomas Elliot;

*At the right hand side- wooden rollers made by William Drake Ltd, 1991;
Grosvenor Chapel, Mayfair, London.*

Rollers are made either of wood or iron. In old work they were mostly made of wood, but in modern organ-building they are often made from iron. Many advantages attending its adoption. The arms may be made of hardwood or of metal. Metal arms, usually iron, were used for wooden rollers in old work of the important treatise by Dom Bedos. These are represented as slender, and with small plain eyes for the reception of tracker hooks. The metal arms are tightly screwed into the wooden rod where required, and are adjusted for the reception of sticker pins, tapped-wires, or tracker hooks, according to the requirements of the action. Rollers are supported on the face of a board or frame, properly designated the roller-board, by means of studs pinned into, or screw to, the same. The studs are commonly made of close-grained hardwood, drilled and sometimes bushed with cloth for the reception of the pivots of the rollers.

In all parts of an organ action every precaution should be taken to eliminate any cause of noise or unnecessary friction. The Drake workshop therefore works to a very high accuracy and doesn't often use cloth bushing as this increases friction.

The tracker action have been generally used in conjunction with the old fashioned, palletted wind-chest and is still used successfully today while building new organs. As all the components parts of the tracker action have been described and illustrated, and their usual combinations outlined, it is necessary to go further into the subject of Mechanical Design.

STOP ACTION (DRAW-STOP ACTION)

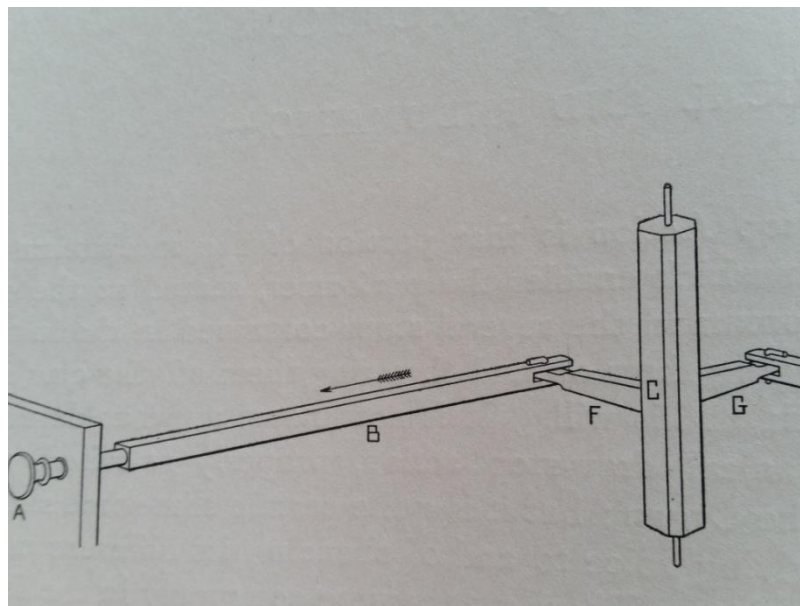
The Stop Action (Draw-stop action) is that portion of the mechanism of the organ which enables the performer, seated at the keyboards, to command the several stops contained in the instrument, bringing them on and throwing them off the keyboards, so to speak, at his will.

It is not known at what date the first mechanical stop action, properly so-called, was added to the organ; but it is quite certain that some simple means of giving voice to and of silencing its different ranks of pipes obtained at a very early date. These means were commonly in the form of perforated sliders, having no mechanism connected with them, and being moved directly by hand. In some historical organs the ends of the sliders are clearly depicted without any mechanical attachments. When the organ was developed and assumed an important form, its sliders and pallet wind-chest, planted with numerous stops, where somewhat clumsy in their construction, and its stop action was correspondingly crude and extremely heavy, requiring a leverage so great as to call for a draw of many inches at the stop-jambs to move the badly-fitted sliders of the wind-chests. So great was the necessary and inconvenient extent of this draw, that instead of stop knobs and rods, having a direct forward motion, long projecting levers were sometimes used, which the performer seated at the keyboards had to draw toward him with considerable force, to bring on the stops, and release or push from him when he desired to throw off the stops.

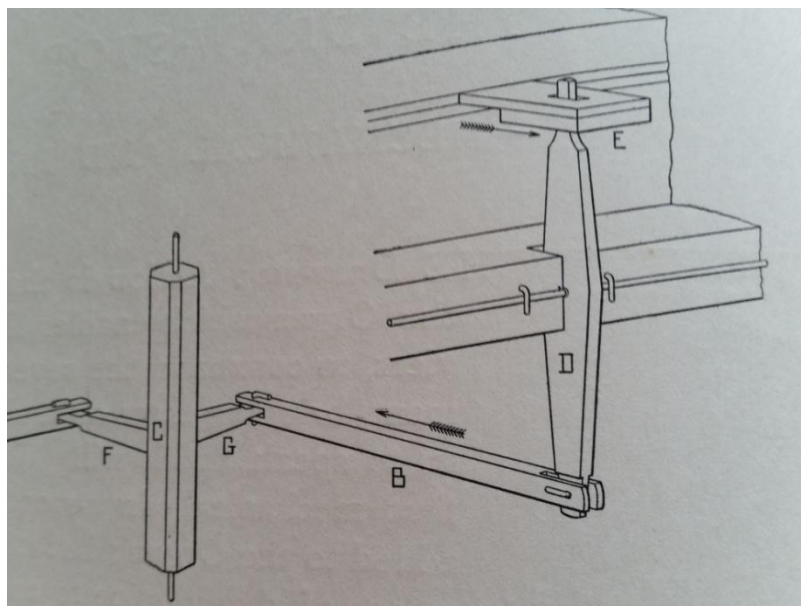


The keyboard view- Stop Knobs with their manually written Stop Labels. Grosvenor Chapel (L), Westminster Abbey Song School (R).

The draw-stop actions introduced in new organs as well, constructed on purely mechanical lines, and with the old style slider and pallet wind-chests, are usually of the simplest form, but perfectly adapted for the work they have to do. We found such purely mechanical stop actions are in all new organs of William Drake Ltd and still existing very well and smoothly, because it is a failure-free mechanism, also inspired from the English Historical Organ. These actions comprise, in addition to the external stop action knobs and rods, internal rods of wood, which push and pull, known as traces; squares or bent levers, usually of brass or iron, employed to carry the action in any required direction. Strong rollers of wood or iron called "trundles", pivoted, and furnished with projecting arms to engage the tracers; and rocking levers or cranked rollers, to operate directly on the projecting ends of the wind-chest sliders.



A- Stop Knob, B- Trace, C- Trundle with its arms



B- Longer Trace, D- Rocking Lever, E- End of the Slider

Referring to the photos above, when the slider E is being pushed in, to shut off the wind from the associated pipes or stop, the action in all its parts has the reverse movement, caused by the performer pushing in the knob A. To enable this to be done without too much exertion the stop action knob is made to travel through a greater distance than that required for the slider E. This is accomplished by making the arm F of the trundle longer than the arm G, as I indicated.



*Stop Action in organ of Westminster Abbey Song School. (L) Rocking Lever, (P) Trundles.
As we can see, all the parts of the stop action are made by the hardwood-oak, and
connected by means of the iron rods.*



(L) *The new organ of Lincoln College, Oxford, 2010, during installation in the workshop. We can see the metal Rocking Levers connected with the Traces (below) and with the small slots in the end of the sliders (above).*

(R) *The Christ Church Spitalfields organ, 1735. These are Stop Tracers (original traces angle-jointed with the new) and behind are visible long and strong wooden stop rollers-Trundles.*

The other activities I was involved with in William Drake's Ltd workshop:

Preparing the organ case before staining and waxing:



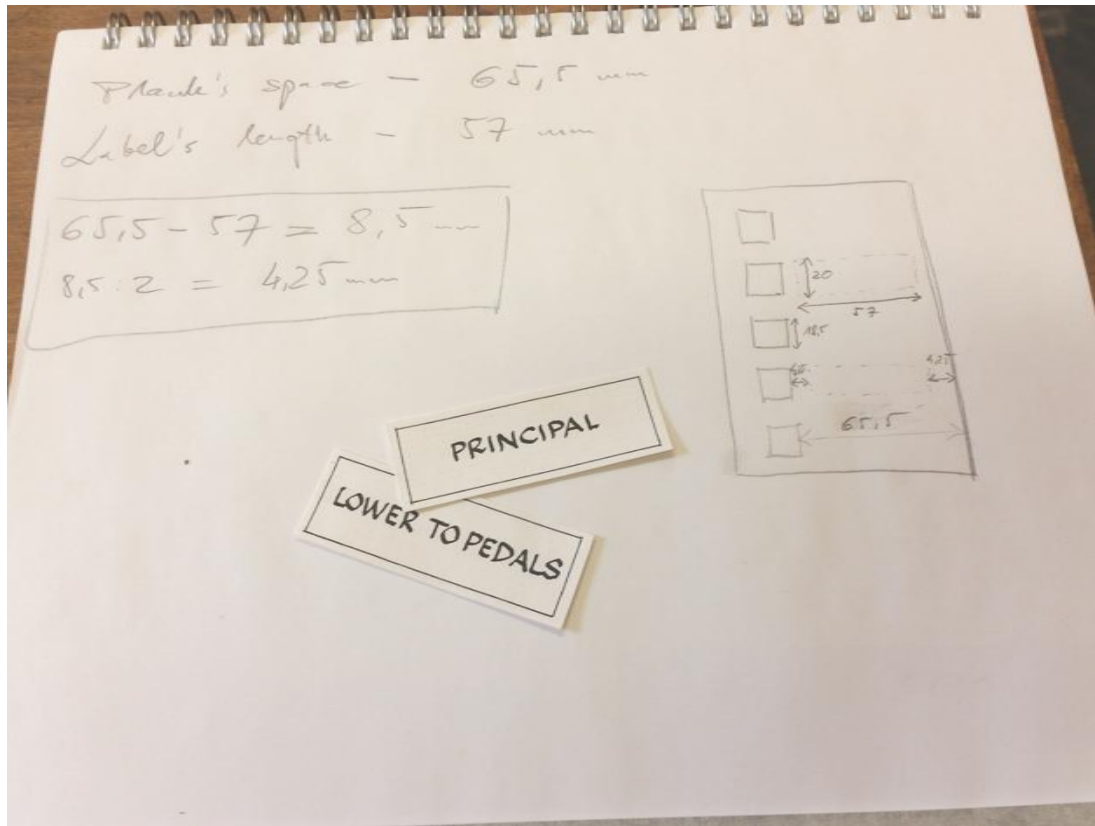
Staining and waxing some parts of the organ case:



Leathering and preparing a square slots in the organ-case for stop action:

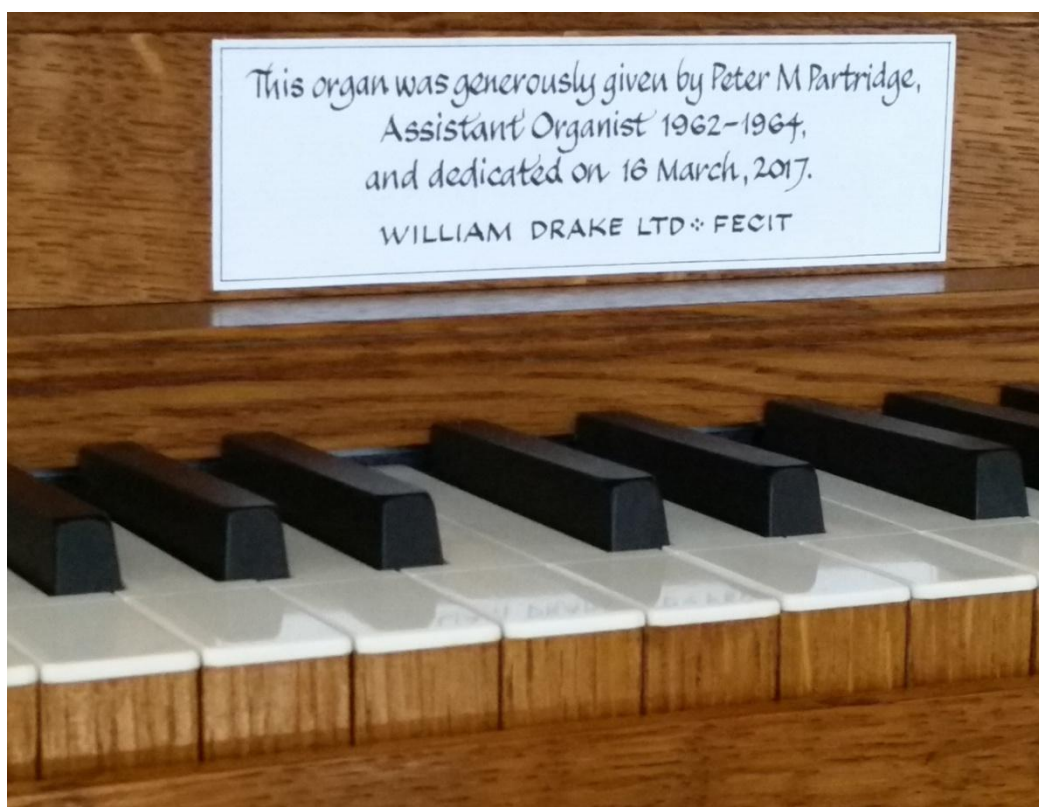


Gluing to them the manually written Paper Labels:





The main label of Westminster Abbey Song School organ:



Graphiting and polishing the sliders:



Racking in the Wooden Pipes:

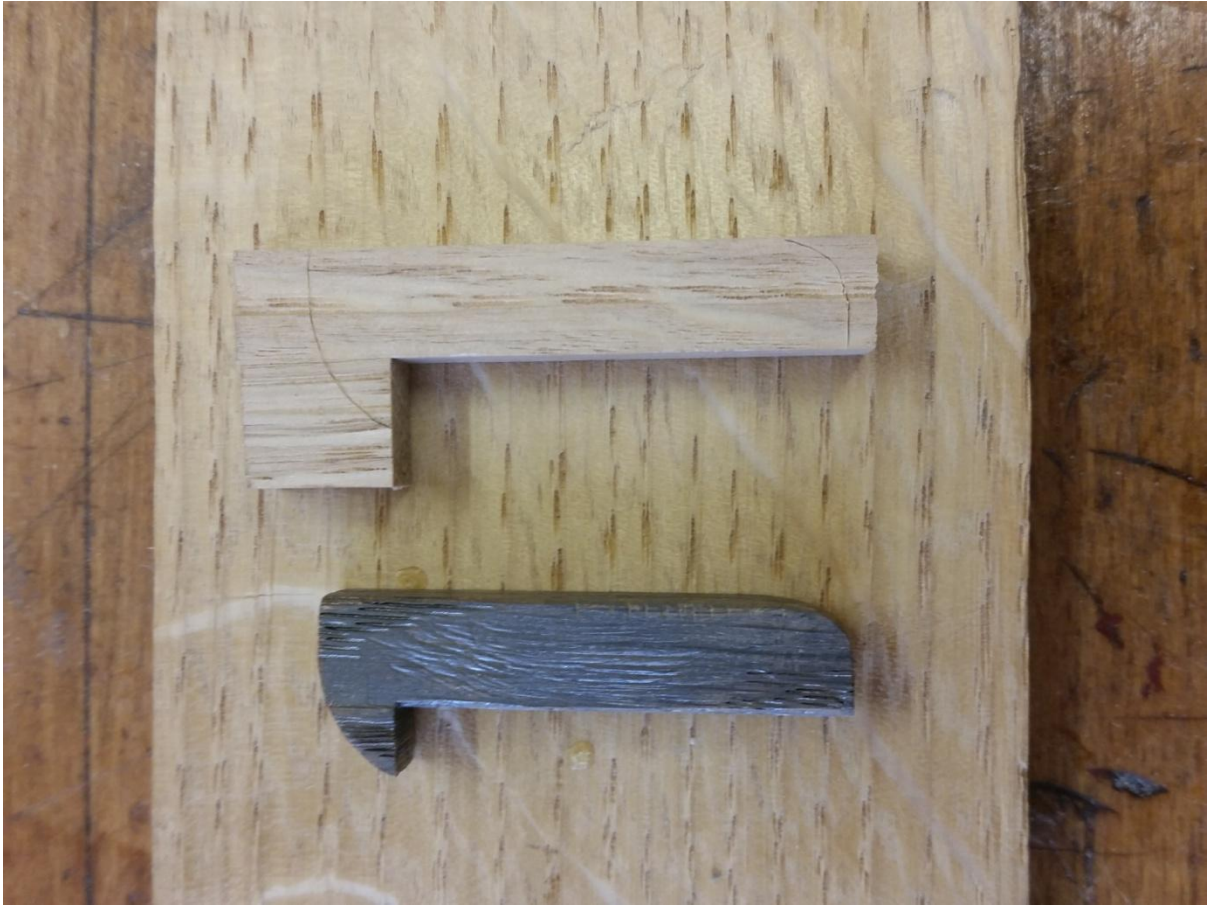


Racking in the Metal Pipes:

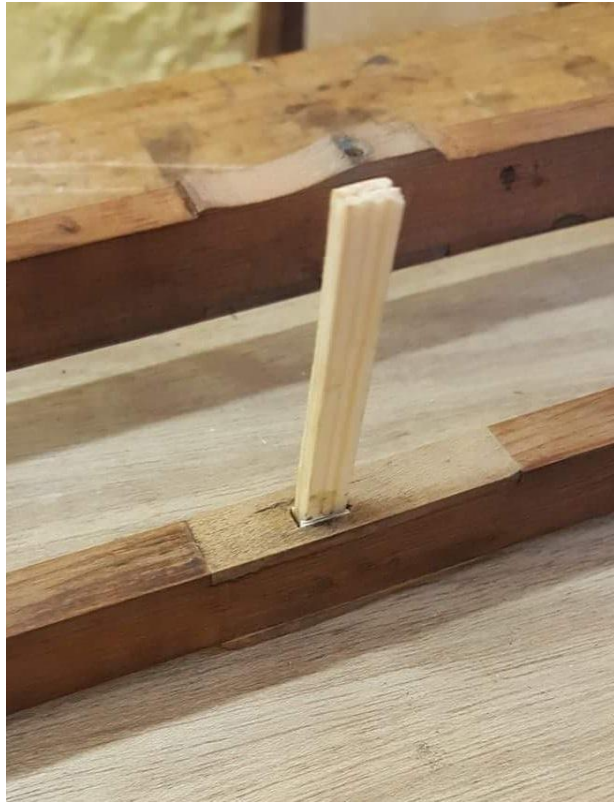




Making of Keyboards Coupler Stickers:



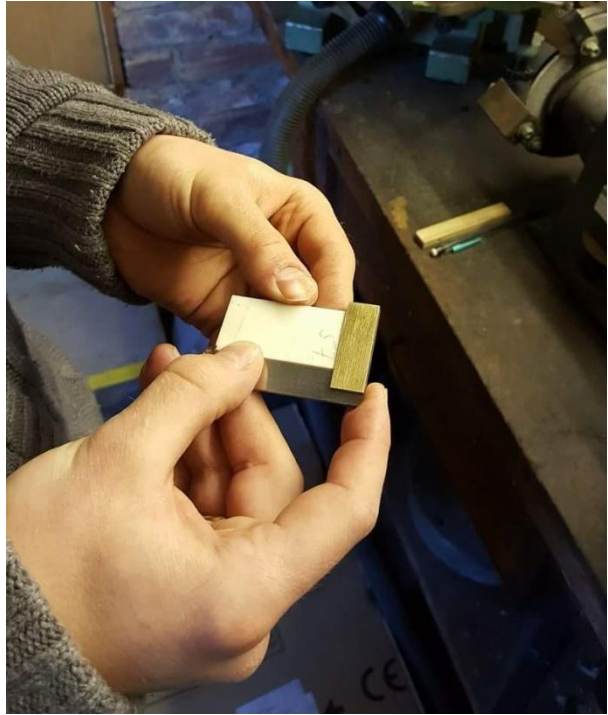
Keyboard restoration-filling worn out guide pin slots in order to fit in pieces of parchment:



Keyboard cover restoration- selecting the best pieces of bone covers:



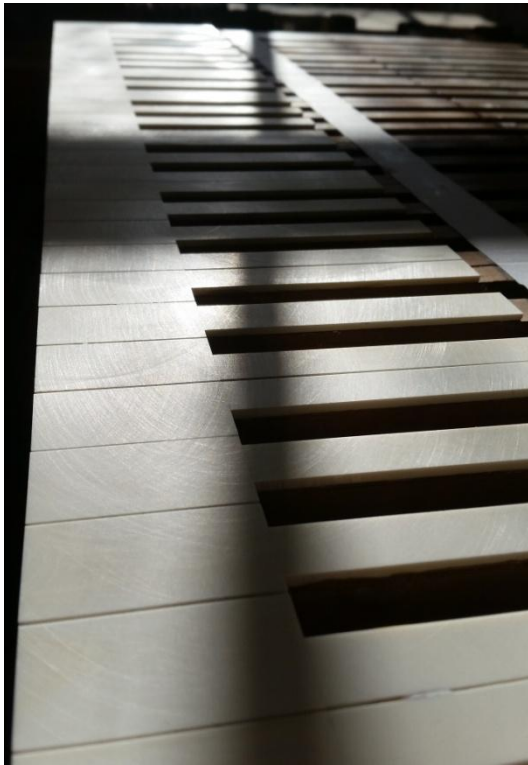
Grinding bone key covers to size:



Gluing and carefully clamping the bone cover using the hot glue



Sanding and polishing the covers:



Putting the finishing touches on the new bone covers:



Restored Thomas Elliot's keyboard presented:



CONCLUSION

This essay contains, of course, only the selected activities that William Drake Limited relies on when building new bodies, fitting them to Stylish, Historic English Instruments. The essay also includes some of the activities I performed during the eight months of work in the workshop.

The time I spend at William Drake Ltd, besides the incredible joy of doing what I like, also brings me invaluable experience in Organ Building, a profession which I associated with my future. It is amazing for me that I am working in such a company for which the historical value of an organ is the most important thing. Through this I have daily contact with historical instruments, which allows me to develop my interest in the history of the English Organ Builders, having a tangible example of how they work, how they did their work, and how their methods of building organs withstood the test of time. In my opinion, this is the best example of how one should build organs which are likely to survive the trial of time. I am convinced that not every organ building company gives the opportunities I have been fortunate enough to have received in William Drake Limited.

Here, I should like to record a special 'thank you' to The Friends of Christ Church Spitalfields for giving me this Travel Bursary, that gave me the opportunity to develop my interests and skills.

I would like to express my gratitude for my mentor Joost de Boer, Director of William Drake Limited, which since last year, has been investing his time towards teaching, explaining and giving me his rich knowledge about everything related to English Organ Building.