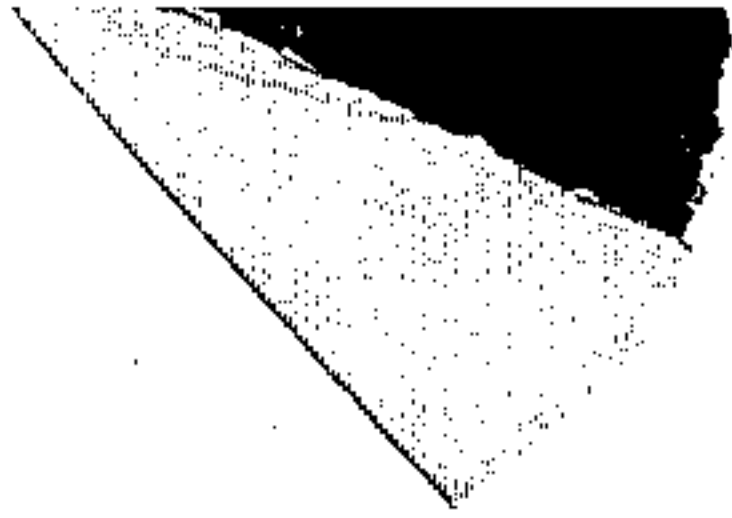


*Apparatus*

*Patented Jan. 4. 1870.*



Inventor,  
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# United States Patent Office.

C. HOPKINS, OF PHILADELPHIA, PENNSYLVANIA.

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## IMPROVED DRILLING, RIVETING, AND WATCH-JEWELLING APPARATUS.

The Schedule referred to in these Letters Patent and making part of the same.

*To all whom it may concern :*

Be it known that I, C. HOPKINS, of the city of Philadelphia, in the county of Philadelphia, and State of Pennsylvania, have invented a new and improved Combination Apparatus for Uprighting, Freeing, Centring, Drilling, Bushing, Wheel-Riveting, Watch-Jewelling, and other purposes connected with the work of watch-making and repairing; and I do hereby declare that the following is a clear, full, and exact description of the construction and operation of the same, reference being had to the annexed drawings, making a part of this specification, in which—

Figure 1 is a perspective view of several of the most important parts of the apparatus in combination.

Figure 2 is a section of the watch-jewelling, freeing, and drilling instruments, in combination.

Figure 3 is an upright centring-piece.

Figures 4, 5, 6, and 7, are views of four different forms of drills and cutting-points for the drilling and freeing-instrument.

Figure 8 is a perspective view of the wheel-riveting punch.

Figure 9 is a section of the same.

Figure 10 is a perspective view of the wheel-riveting stake.

Figure 11 is a section of the same.

Figure 12 is a view of a section, in miniature, of a wheel-riveting punch, formed in the end of its own handle.

Figure 13 is a side view of one of the forms of cutter for the watch-jewelling and freeing instrument.

Figures 14 and 15 are modified forms, in miniature, of the uprighting-piece.

This apparatus is designed to facilitate the work of the watch-maker and repairer in the execution of several of the most important parts of the work that is required to be performed by him, namely, uprighting watch-wheels, by determining the correct centres for opposite pivot-holes; marking the centres and drilling holes upright after the correct points for drilling have been determined; freeing the wheels and other parts of watches where binding, chafing, or undue friction is found to exist between the acting and stationary parts; cutting off and finishing pivot-hole bushings; making new jewel-hole settings, and resetting jewels where previous ones have been broken out; and riveting wheels upright on their pinions.

Heretofore, it has required the use of five or six separate and distinct tools or sets of tools, and some of them expensive ones, to perform properly the different kinds of watch-work above referred to, and the greatest difficulty experienced by a large majority of watch-repairers, in executing fine work, has arisen from the want of some one or more of these several tools, the aggregate expense of which having been greater

than they were able to afford, while in one particular at least, namely, that of riveting wheels upright on their pinions, no tool or set of tools has, I believe, ever been heretofore employed, the riveting-punches used for this purpose having always been guided in their upright position solely by the hand, and were consequently ever liable to inaccuracy as to results of their use.

To obviate, however, all these several difficulties, and to place within the reach of watch-makers and repairers, even of very moderate means, facilities for executing quickly and accurately all these more difficult parts of watch-work, I have invented the combination apparatus hereinafter described.

In the drawings—

A represents a metallic bed, of any appropriate form, flat and perfectly level on its top, but having the projecting part *a*, underneath, extending downward to the distance of two or three inches, or sufficiently far to afford ample bearing for the back centring-piece B, which passes upward through the centre of this projecting part and through the bed A, at right angles with its top. This projecting part also serves as a means for fastening the tool in the bench-vise when in use.

The lever-clamps C C, attached to the top of the bed, serve as a ready means for fastening the parts of the watch to be operated upon securely in proper position on the bed, while the uprighting-piece D D, also attached to the top of the bed A, as represented, and which may be made with double top bearings, as in figs. 1 and 14, or with single long bearing, as in fig. 15, serves to guide and sustain the handles of the centring, freeing, drilling, wheel-riveting, and watch-jewelling instruments in upright position, and in line with the back centring-piece B when in use.

The parts A B and D D, together with the centring-piece I, constitute, though in somewhat modified form, an ordinary watch-maker's uprighting-tool, the clamps C C being a simple addition thereto. This tool being so well known, probably needs no further description, except in so far as its combination with the several instruments above referred to is concerned, each of which I will now proceed to describe.

The instruments for drilling, freeing, bushing, and watch-jewelling purposes, as will be seen by the drawings, are formed in combination, having one and the same handle, E, each of the several other parts being inserted therein or attached thereto, as occasion requires.

The handle E just referred to, is made cylindrical in form, perfectly straight, and so fitted as to work snugly, but without undue friction, in the vertical holes made for it in the uprighting-piece D D; and in order to form a place for attaching to it the cutting and bur-



nishing-pieces G, hereinafter described, about one-third, or a little more than one-third of one side of it, is flatted off to the extent of about two inches from its lower end upward, and the remaining part of its lower end is formed into an ordinary drill-stock, as shown more clearly at *e v*, fig. 2, the bore *v*, made to hold the drills and freeing-points, being formed in exact line with the centre of the shaft or handle, and so as to stand directly over the point *b* of the back centring-piece B.

The drill-stock as thus formed, and in combination with the bed A, the back centring-piece B, the clamps C C, and the uprighting-piece D D, may be used for all the purposes of centring holes to be drilled, upright drilling, freeing wheels where there is not sufficient end-shake to the pinions, and for cutting off pivot-hole bushings level with the surface of the plate in such manner as not to mar the surrounding parts, the drills and cutters for these several purposes, several forms of which are represented in figs. 4, 5, 6, and 7, being so varied in shapes and sizes as to adapt them to each special purpose for which they are respectively required to be used. Those for freeing-purposes and for cutting off bushings, &c., are made to correspond both in form and in the mode of using with the cutters of an ordinary watch-maker's freeing-tool, the instrument, when in use, being rotated either with the fingers or with the drill-bow, as preferred, the piece H serving the double purpose of a collet for the drill-bow and a gauge for fixing the depth to which the instrument may be made to work.

For centring with the drill-stock, and for upright drilling, the drill should be so set that its point will stand in exact line with the point *b* of the back centring-piece, the handle E being, as it necessarily is, held at the same time at exact right angles with the top of the bed A, by the uprighting-piece D D. Then, in order to find the correct centre of a pivot-hole, the opposite one being already known, all that is necessary is to fasten the parts of the watch together in their proper positions, place the hole already known over the conical point of the back centring-piece B, and clamp the watch in this position level on the bed A. Then, on bringing the drill down on the upper side of the watch, as thus placed, it necessarily strikes a point exactly perpendicular above the other hole, and the drill thus finds its own centre, and drills the hole upright at the same time. Or, for uprighting and centring only, the centring-piece I may be used, in combination with the other parts of the uprighting-tool, as in the ordinary way of uprighting, when this is preferred for the purpose, to the use of the drill-stock, as described.

The arms G, with cutting and burnishing-points *g* formed on their lower ends for general watch-jewelling and wheel-freeing purposes, are made of spring-steel, flat on one side and rounded on the other, so as to make them, at least at their upper ends, to fit accurately the part flatted off from the side of the handle E; and when required for use, they are fastened to the handle by means of the collar F and the thumb-screw *f*, as shown clearly in figs. 1 and 2, the collar being there represented as passing over and around both the handle and the upper part of the arm, while the thumb-screw passes through one side of the collar and through the handle, pressing with its point against the under side of the arm G, and forcing it outward against the hollow under side of the collar, and thus holding it firmly in position on the handle, but in such way that a single backward turn of the screw will free it, and thus enable the operator instantly to remove it, and to insert another in its place when he desires to do so; or the thumb-screw *f* may be made to pass through the collar only while its end presses against the side of the handle, thus drawing the collar toward it, and forcing it down tightly over the end of the arm G on

the opposite side. Also, as an additional means of preventing the arm from moving sideways on the handle, when in use, the under side of the arm may be grooved longitudinally, and a tongue formed on the flatted side of the handle, or two or three short pins placed in it, that will slide into this groove as the arm is pushed into its place.

The tendency of the arm G, when fastened thus in position, is to draw inward close against the arm, while its bent lower end falls still further inward over the end of the arm, and thus bring its cutting or burnishing-point *g*, when at rest, in line with the point *b* of the back centring-piece.

The cutting and burnishing-points formed on the lower end of the spring-arm just described, may be varied in shape to any desired extent, according to the particular form of the cutting to be executed, or the shape of the part to be burnished; and the cutting-edges may be either on the end, and made to cut from the surface of the plate downward, or on the side, and made to cut from the centre outward, horizontally, or they may be on both the side and end of the same piece. And, in like manner, the burnishing-parts may be either on the side or on the end, the edges of these being always rounded and carefully polished, instead of sharp. That for opening the mouth or lifting up the edges of a jewel-setting, should be formed on the side, and made to press from the centre outward as the instrument is rotated, the proper depth to which it should enter the setting having been previously fixed by an adjustment of the collet H, while that for fastening the jewel in its place in the setting should be on the end, and bevelled inward toward the centre, somewhat as shown at *g*, fig. 1, and, in use, should press from the top downward; the thumb-screw *o*, which passes at right angles through the lower end of the handle, and presses with its point against the under side of the arm G, as shown in figs. 1 and 2, serving, both in regard to the cutting and burnishing-points, to force them outward, and to set them at the required distances from the centre, or, when so required, to move them outward by degrees as the work of cutting or burnishing progresses; the small set-screw *p* serving, at the same time, to fix at pleasure any desired depth on the screw *o*, beyond which it cannot work.

In forming new jewel-settings with this instrument, the hole to be operated upon should be brought to centre by placing it over the conical end *b* of the back centring-piece, and in this position the bridge or plate, as the case may be, clamped level and firmly on the lid A by means of the clamps C C. The back centring-piece should then be lowered out of the way, the form of cutter desired attached to the handle E, and the collet H so adjusted that the cutter can only work below the surface of the plate to the depth of the thickness of the jewel to be inserted, which may be readily done in the following way:

First, fasten the cutter firmly in position on the handle, then loosen the collet H, and bring the instrument down so the point of the cutter will rest on the top of the plate to be jewelled, after which lay the bare jewel on the top of the uprighting-piece D D, with its edge against the handle E, and move the collet downward until it rests on it, and fasten it in this position. Then, on removing the jewel, the space between the collet and the top of the uprighting-piece will indicate the depth to which only the cutting-point can work below the surface of the plate.

Having thus adjusted the several parts, the work of cutting either or both the inside and outside of the setting may be performed by rotating the instrument with the fingers, or, when preferred, by use of the drill-bow, as in the case of drilling, using, at the same time, the thumb-screw *o*, before described, to move the cutter outward from the centre as the work progresses.



The form of cutter used, will, of course, determine in great measure the shape of the setting, especially as to whether the walls shall be perpendicular, as in the English and most of the American watches, or under-cut like the bezel for a watch-crystal, as in Swiss watches.

In case of under-cutting the walls, after the cutting has proceeded sufficiently far to form the requisite seat for the jewel, the cutter should be withdrawn and a smooth side-burnishing point inserted in its place, and with this, by rotating the instrument as before, the edges of the setting should be burnished or lifted up perpendicular, for the double purpose of opening the mouth of the setting sufficiently to admit the jewel, and at the same time to raise a burr around its edges, that may be again burnished down over the edges of the jewel, to hold it in its place. (In case of perpendicular walls, this latter operation is omitted, the bevelled sink around the outside of the setting being made sufficiently deep and abrupt to answer the same purpose.)

After fully preparing the setting, as described, the end-burnisher should be substituted for the side one just used, and with this, after dropping the jewel in its place, the setting be burnished down closely over its edges.

In resetting jewels that have been broken out, the two burnishing-points only are used, the work being performed in precisely the same way as new work, omitting the cutting.

For wheel-freeing and other like purposes, the same cutter may be used as for cutting the bevelled sink around the outside of jewel-settings; or a cutter more nearly square on its edge may be used, so as to make a smoother face-cutting, the collet H, in all such cases, as also in using the cutting and freeing-points with the drill-stock, being used to fix the depth to which it may be desired the cutter should work.

For riveting wheels upright on their pinions, the riveting-punches K are made, three or more in number, of the usual form of punches for this purpose, and of assorted sizes, to adapt them to the different-sized pinions, and the bore *k*, formed in its upper end, is made of suitable size and length to pass over and to fit snugly in the part *i* of the upright piece I; or each of the several punches may be formed in the end of a separate and distinct upright handle, M, as shown in the miniature section, fig. 12; these punches being in all cases made of steel, and the lower or riveting-ends hardened and carefully polished.

The riveting-stake L may be made either of steel or of hard, polished bell-metal, and should be perfectly flat, and of uniform thickness, with some half dozen

or more upright holes drilled through it, of assorted sizes, ranging from that of the smallest to the largest-sized pivot-hole, each of which should be countersunk from the back nearly through the stake, as shown in the section thereof, fig. 11.

Then, in riveting wheels on their pinions, a hole of suitable size in the stake should be selected, and brought to centre by placing the back of the hole over the conical back centre *b*, and in this position the stake should be clamped securely on the top of the bed A.

The pinion should be placed in an upright position on the stake, with its pivot resting in the previously-centred hole, and the wheel be placed on the pinion in proper position to be driven home; after which, a punch of suitable size should be brought to bear upon it, with its handle passing through the holes in the top of the uprighting-piece D D, and thereby held in an upright position, and with a blow or two of the riveting-hammer on its top, the wheel be driven home on the pinion and fastened there.

From an examination of this contrivance, it will be readily seen that if the several parts are accurately made and properly used, it is scarcely possible to rivet a wheel on its pinion otherwise than upright with it; and that its use will wholly avoid the hitherto frequent occurrence of wheels being thrown out of centre and out of upright by inaccurate riveting.

Having thus described my improved invention, so that any one skilled in the work can use the same,

What I claim as new, and desire to secure by Letters Patent, is—

1. The arm G, with cutting and burnishing-points *g*, in combination with the handle E, the collar F, and the thumb-screws *f* and *o*, substantially as and for the purposes described.

2. The combination of the subject-matter of above clause with the drill-stock *e v*, substantially as described, and for the purposes set forth.

3. The combination of the riveting-punch K and stake L, with the bed A, centring-piece B, the uprighting-piece D D, and the upright handle I or M, substantially as and for the purposes set forth.

4. The improved combination uprighting, freeing, centring, drilling, wheel-riveting, bushing, and watch-jewelling apparatus herein described, the several parts being constructed and operated in combination, substantially as set forth.

C. HOPKINS.

Witnesses:

JOHN KNOX,  
E. W. MASSON.