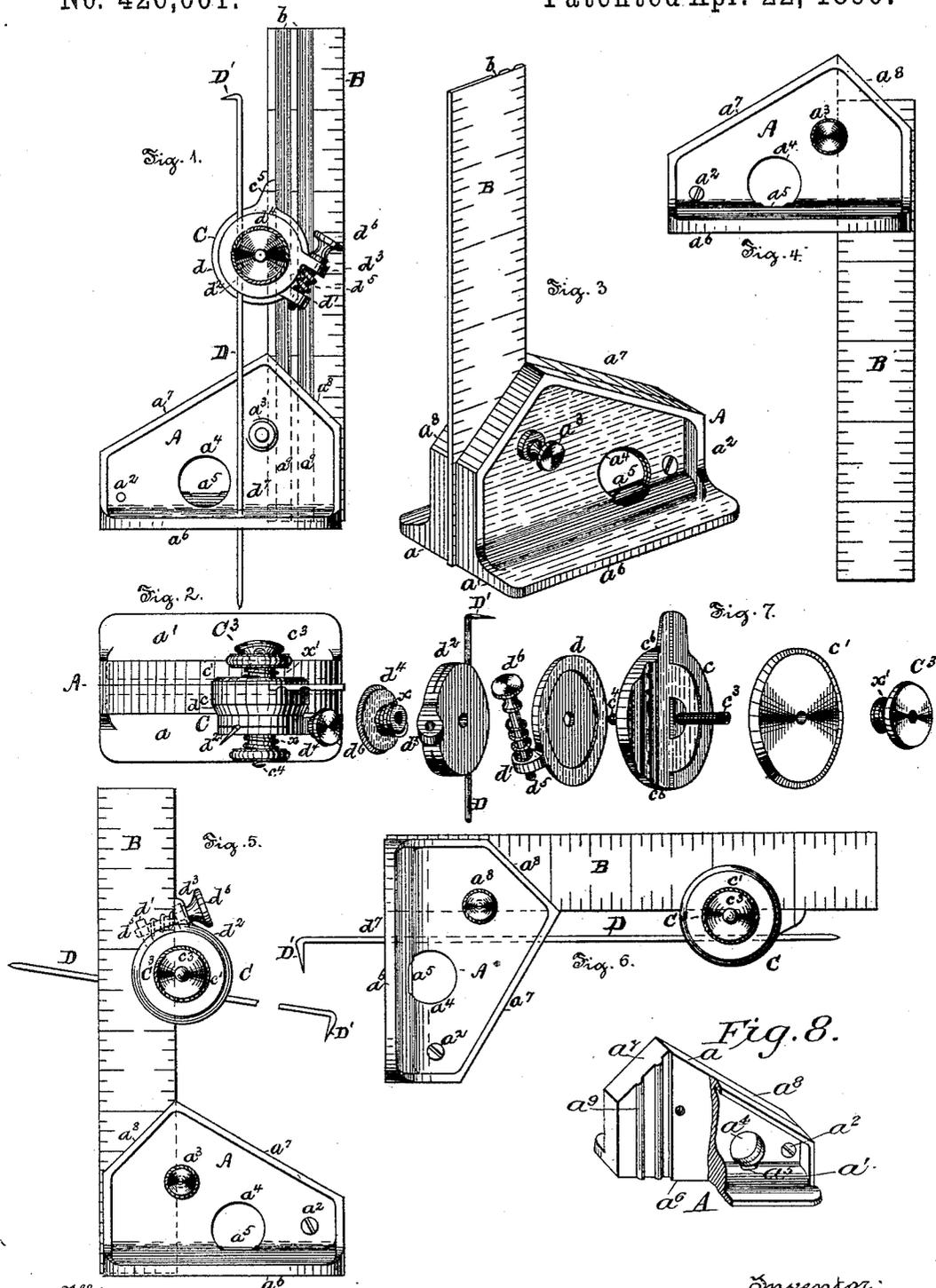


(No Model.)

H. W. EVANS.  
COMBINED SQUARE, LEVEL, AND SURFACE GAGE.

No. 426,001.

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# UNITED STATES PATENT OFFICE.

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## COMBINED SQUARE, LEVEL, AND SURFACE-GAGE.

SPECIFICATION forming part of Letters Patent No. 426,001, dated April 22, 1890.

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*To all whom it may concern:*

Be it known that I, HAMPTON W. EVANS, a citizen of the United States, residing at Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Combination-Tools, of which the following is a specification.

My invention relates to combination-tools for laying out, scribing, and measuring machine-shop work; but it is applicable in whole or in part for other purposes.

Heretofore in machine-shop practice it has been customary to employ dividers, T-squares, spirit-levels, surface-gages, depth-gages, and graduated rules for laying out, scribing, and gaging work of various kinds; but the employment of these separate tools is very expensive and entails the following disadvantages: first, an excessive consumption of time and labor; second, manifold inaccuracies in linear and angular measurements, and, third, injury to the tools incident to their falling upon the ground or floor. Moreover, these separate tools were apt to be lost or mislaid.

The principle objects of my present invention are, first, to obviate the above-mentioned disadvantages, and, second, to provide a compact, durable, accurate, and efficient tool for laying out, gaging, and scribing machine-shop work and for other purposes.

My invention consists of certain details and of the combination and arrangement of the parts of the tool hereinafter more fully set forth, and pointed out in the claims.

The nature and characteristic features of the invention will be more fully understood from the following description, taken in connection with the accompanying drawings, forming part hereof, and in which—

Figure 1 is a side elevation of a combination-tool embodying the principal features of my invention and showing the parts thereof in position for use as a depth-gage. Fig. 2 is a top or plan view thereof. Fig. 3 is a perspective view of the tool having the divided head and the scriber removed therefrom and showing the parts thereof arranged for use in laying off angles and perpendicular lines. Fig. 4 is a side elevation of the tool, showing the stock and scale-blade thereof in position for use as a T-square. Fig. 5 is a side elevation

of the tool, showing the parts thereof adjusted for utilization as a surface-gage. Fig. 6 is a similar view of the tool, showing the parts thereof adjusted to constitute a scratch-gage. Fig. 7 is a perspective view, on an enlarged scale, of the detail parts constituting the sliding head for carrying the scriber; and Fig. 8 is a perspective view of the divided stock, having a portion broken away and showing the parallel ribs thereof.

Referring now to the drawings, the stock or base A is composed of two sections  $a$  and  $a'$ , secured together by a screw or rivet  $a^2$  and by an adjustable set-screw  $a^3$ .  $a^1$  is an aperture cast or otherwise formed in the webs of these sections  $a$  and  $a'$ . The spirit-level  $a^5$  is secured in the aperture  $a^1$  and may be readily seen from both sides of the tool. The lower side  $a^6$  of the stock A is planed or otherwise made flat, and the other sides  $a^7$  and  $a^8$  thereof are surfaced and caused to form any preferred angles with the lower side  $a^6$ —for example, at angles of forty-five degrees, sixty degrees, and one hundred and twenty degrees. The parallel convex ribs  $a^9$  are milled or otherwise formed in a recess cut in the interior surface of the section  $a$ , and extend across the same at right angles to the lower side  $a^6$  thereof.

B is a graduated scale-blade, having parallel concave grooves  $b$  cut or otherwise formed therein. This scale-blade B normally fits into the recess in the section  $a$  of the stock A, and the convex ribs  $a^9$ , engaging with the concave grooves  $b$ , permit of the scale B sliding through the stock A, but always maintain the scale at right angles with the side  $a^6$  of the stock A. The blade B may be clamped in any desired position in the stock A by means of the set-screw  $a^3$  passing through both the sections  $a$  and  $a'$  of the stock A.

C is a sliding head, composed of the plates  $c$  and  $c'$ , secured together by means of a set-screw  $C^3$ . This set-screw  $C^3$  is provided with a spiral spring  $x'$ , coiled around the shank thereof, for pressing the two halves  $c$  and  $c'$  of the sliding head C into close contact with the opposite sides of the scale-blade B when the set-screw  $C^3$  is loosened, so that the sliding head C may be freely adjusted upward and downward upon the scale-blade B, while at the same time moving with sufficient friction to retain it to place until it is clamped by the

set-screw  $C^3$  for use. The plate  $c$  is slightly dished on both sides thereof, and is provided with two horizontal central shafts  $c^3$  and  $c^4$  and with an index  $c^5$ .

5  $c^6$  are parallel convex ribs, milled or otherwise cut on the interior surface of the plate  $c$ . These ribs  $c^6$  normally engage with the concave grooves  $b$  of the scale-blade B.

The head C may be readily slid upward or downward, as above described, and finally clamped in position upon the scale-blade B, by means of the spring-actuated set-screw  $C^3$ .

The dish-shaped plate  $d$ , provided with a tapped or threaded lug  $d^1$ , and the divided or spring-clamp  $d^2$ , also provided with a lug  $d^3$ , are both mounted upon the horizontal shaft  $c^4$ , and are secured in proper position thereon by means of the set-screw  $d^4$ . This set-screw  $d^4$  is provided with a spiral spring  $x$ , coiled around the shank thereof, for a purpose to be presently described. The scriber D, provided with a hook-shaped point  $D'$ , slides freely in suitable recesses formed in the clamp  $d^2$ , and is retained in proper position therein by means of the spring-actuated set-screw  $d^4$ . This spiral spring  $x$  is interposed between the plate  $d^2$  and the set-screw  $d^4$ , in order to insure sufficient frictional contact of the plates  $c$  and  $d$  with one another and of the divided portions of the clamp  $d^2$  when the set-screw  $d^4$  is loosened, in order that the scriber D may be readily adjusted not only through the clamp-plate  $d^2$ , but also around the set-screw  $d^4$ , while at the same time retained to place until clamped by means of said set-screw for use. The spiral spring surrounding the micrometer-screw  $d^5$  is in compression and bears at the respective extremities thereof against the lugs  $d^1$  and  $d^3$  for maintaining the lug  $d^3$  normally in contact with the head of the micrometer-screw  $d^5$ . The micrometer screw-head  $d^5$  is for rotating it either to the right or to the left in order to adjust the relative position of the plate  $d$  and of the clamp  $d^2$ , as hereinafter more fully described.  $d^7$  is a small aperture drilled or otherwise formed through the section  $a$  of the stock A, and adapted to receive the scriber D.

Referring now especially to Figs. 1 and 2, and in connection therewith, a brief description of the mode of operation of the combination-tool arranged for use as a depth-gage will be given. The scale-blade B is clamped to place in the stock or base A and the scriber D, passing through the aperture  $d^7$ , is also secured to place in the spring-clamp  $d^2$ . The stock A is then placed upon a level surface, and the head C is slid along the blade B until the point of the scriber D contacts with the level surface and the position of the index  $c^5$  with reference to the graduated scale B is noted.

For the sake of a further description of the mode of operation of my invention it will be assumed that the gage is to be utilized for measuring the depth of a hole or recess countersunk in a flat plate. This result is accomplished by placing the aperture  $d^7$  over the

hole or recess to be measured and sliding the head C downward until the point of the scriber D contacts with the bottom of the hole or recess, and then noting the position of the index  $c^5$  with reference to the scale-blade B. It is evident that the difference between the two positions of the index  $c^5$  with reference to the scale B correctly indicates the depth of the countersunk hole or recess.

Although the mode of operation of the combination-tool has been explained with reference to the measurement of the depth of a countersunk hole or recess, still it will be obvious to those skilled in the art of metal working that it may be advantageously used for numerous analogous purposes.

Referring now to Fig. 3 for a description of the mode of utilizing my improved tool for laying off angles and for drawing perpendicular lines, the sliding head C is removed and the scale-blade B is clamped in position in the stock or base A. In order to lay off a perpendicular or plumb line the stock is placed and maintained in a level position by means of the spirit-level  $a^5$ , and a perpendicular or plumb line may be readily and accurately obtained by drawing a scriber-point or other preferred instrument along the edge of the scale B. Angles may be laid off upon a flat surface by holding the sides  $a^7$  or  $a^8$  in contact with a straight-edge in the usual manner, and then drawing a scriber-point or other preferred instrument along the scale-blade B. In order to use the combination-tool as a T-square, Fig. 4, the scale-blade B is slid downward through the base or stock A and clamped to place. It may be remarked that this T-square may be used as a depth-gage by placing and maintaining the stock in a level position by means of the spirit-level  $a^5$ , or in any other convenient manner, and then sliding the scale B upward or downward through the stock A; but preference is given to the arrangement of the tool hereinabove described and illustrated in Figs. 1 and 2 for this purpose.

Referring now especially to Fig. 5 for a brief description of the mode of operation of the combination-tool arranged for use as a surface-gage, the scale-blade B is clamped to place in the stock A, and the latter is maintained in a horizontal position by means of the spirit-level, as above described. The head C is then slid upward or downward upon the scale-blade B until the scriber D contacts with the surface to be measured. This contact between the scriber D and the surface to be gaged may be accurately ascertained and adjusted by means of the micrometer-screw  $d^5$  in the following manner: After the head C is clamped to place upon the scale B by means of the spring-actuated set-screw  $C^3$ , and after the scriber D is brought into close proximity with the surface to be gaged, the micrometer-screw  $d^5$  is rotated and the dished side of the plate  $d$ , bearing upon the dished side of the plate  $c$ , remains at rest, and the

plate  $d^2$ , carrying the scriber D, is slowly rotated until the scriber D contacts with the surface to be gaged.

The arrangement of the tool shown in Fig. 6 is identical with the arrangement shown in Figs. 1 and 2, with this exception, that the scriber D is turned end for end, so that the hook-shaped extremity D' thereof is located below the lower side  $a^b$  of the stock A, thereby permitting of the utilization of the tool as a scratch-gage for drawing lines in recesses and countersunk chambers and for other analogous purposes.

Although the combination-tool has been described in connection with certain specified uses, still my invention is not limited to such uses, because it is applicable in whole or in part for many purposes other than those above mentioned.

Having thus described the nature and objects of my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. The combination of a divided stock having a straight lower edge and the opposite edges at angles of forty-five degrees, sixty degrees, and one hundred and twenty degrees with said straight-edge, interior parallel ribs raised upon a recessed portion of one section of the stock, a grooved scale-blade engaging with said ribs and sliding at right angles with the straight-edge of said stock, substantially as and for the purposes set forth.

2. The combination of a grooved scale-blade, a divided stock engaging therewith, and a divided head provided with an index and with interior ribs engaging with said scale, substantially as and for the purposes set forth.

3. The combination of a grooved scale-blade, a divided head engaging therewith, a scriber, and a divided clamp embracing said scriber and said clamp pivotally secured to said head, substantially as and for the purposes set forth.

4. The combination of a grooved scale-blade, a divided head engaging therewith, a scriber, a divided clamp embracing said scriber and said clamp pivotally secured to said head, and means for clamping said scriber to place, substantially as and for the purposes set forth.

5. The combination of a scriber, a divided clamp embracing said scriber and provided with a lug, a sliding head provided with a spindle, a plate provided with an internally-threaded lug and mounted on said spindle, a spring-actuated micrometer-screw engaging with said lugs, and means for securing the clamp on said spindle to said plate, substantially as and for the purposes set forth.

6. The combination of a scale-blade, a sliding head provided with a threaded spindle, a plate and a divided clamp, respectively provided with lugs and mounted on said spindle, a screw engaging with said lugs, and a set-screw engaging with said spindle, substantially as and for the purposes set forth.

7. The combination of a scale-blade, a sliding head provided with a threaded spindle, a

dish-shaped plate and a divided clamp mounted on said spindle, and means, substantially as described, to revolve said clamp with relation to said plate and said scale-blade, substantially as and for the purposes set forth.

8. The combination of a stock provided with an aperture, a scale-blade secured thereto, a head engaging with said scale-blade and provided with an index and with a scriber, and said stock adapted to permit of the scriber being inserted therethrough, substantially as and for the purposes set forth.

9. The combination of a stock provided with a spirit-level and an aperture, a scale-blade secured to said stock, a sliding head engaging with said scale-blade and provided with a scriber adapted to be inserted through said stock, substantially as and for the purposes set forth.

10. The combination of a stock provided with a straight-edge and with an aperture, a grooved scale-blade held in said stock at right angles to said straight-edge, a sliding head provided with a scriber, and said scriber passing through the aperture of said stock at right angles to said straight-edge, substantially as and for the purposes set forth.

11. The combination of a scale-blade, a divided head, a threaded spindle passing transversely through said head, a set-screw engaging with said spindle, and a spiral spring interposed between said set-screw and said head, substantially as and for the purposes set forth.

12. The combination, in a tool, of a divided clamp pivotally mounted on a threaded spindle, a set-screw engaging with said spindle, and a spring interposed between said set-screw and said clamp, substantially as and for the purposes set forth.

13. The combination of a divided stock having a clamp-screw and arranged at angles of forty-five degrees, sixty degrees, and one hundred and twenty degrees, and said stock provided with a slot and internal ribs, a double-grooved blade mounted in said slot and held rigidly in engagement with said ribs by said clamp-screw, substantially as and for the purposes set forth.

14. The combination of a divided stock, as shown and described, with an enlarged base adapted to receive a spirit-level, and so as to be observed from both sides thereof, and the faces of said stock arranged at forty-five degrees, sixty degrees, and one hundred and twenty degrees to the base thereof, and a parallel grooved scale-blade held in said stock, substantially as and for the purposes set forth.

In witness whereof I have hereunto set my signature in the presence of two subscribing witnesses.

HAMPTON W. EVANS.

Witnesses:

GEO. W. REED,  
THOMAS M. SMITH.