

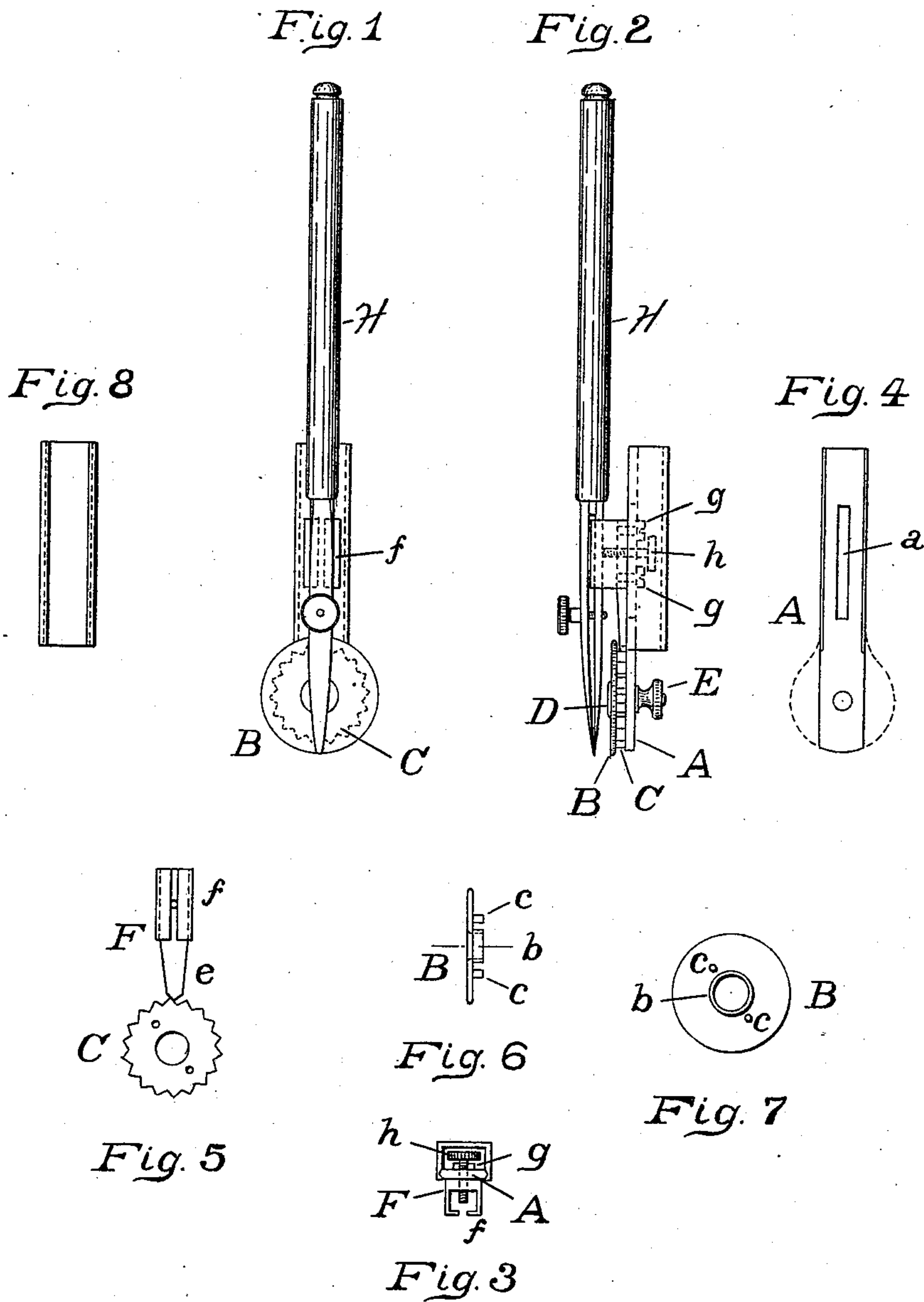
(No Model.)

2 Sheets—Sheet 1.

J. H. KNIGHT.
INSTRUMENT FOR MAKING BROKEN LINES.

No. 541,553.

Patented June 25, 1895.



WITNESSES:

C. S. Chrisman
Perry McGeorge

INVENTOR

James Harner Knight.
by Harold P. May atty

(No Model.)

2 Sheets—Sheet 2.

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Fig. 9

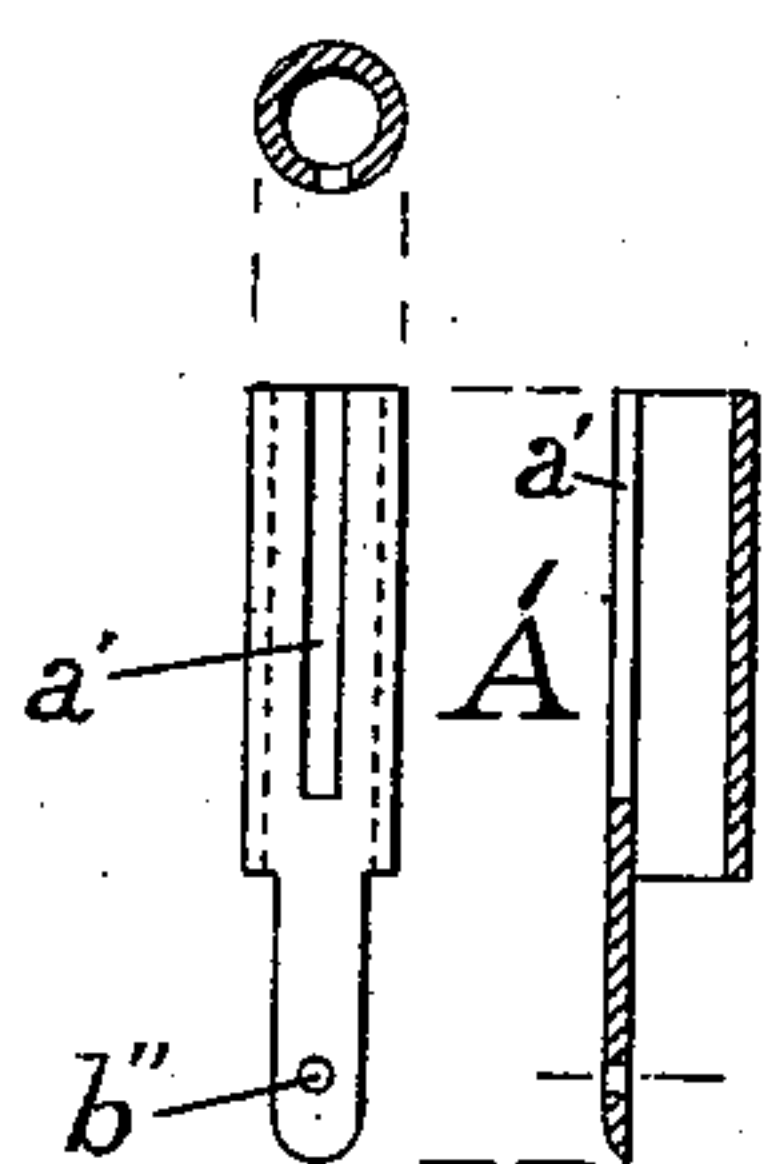


Fig. 10

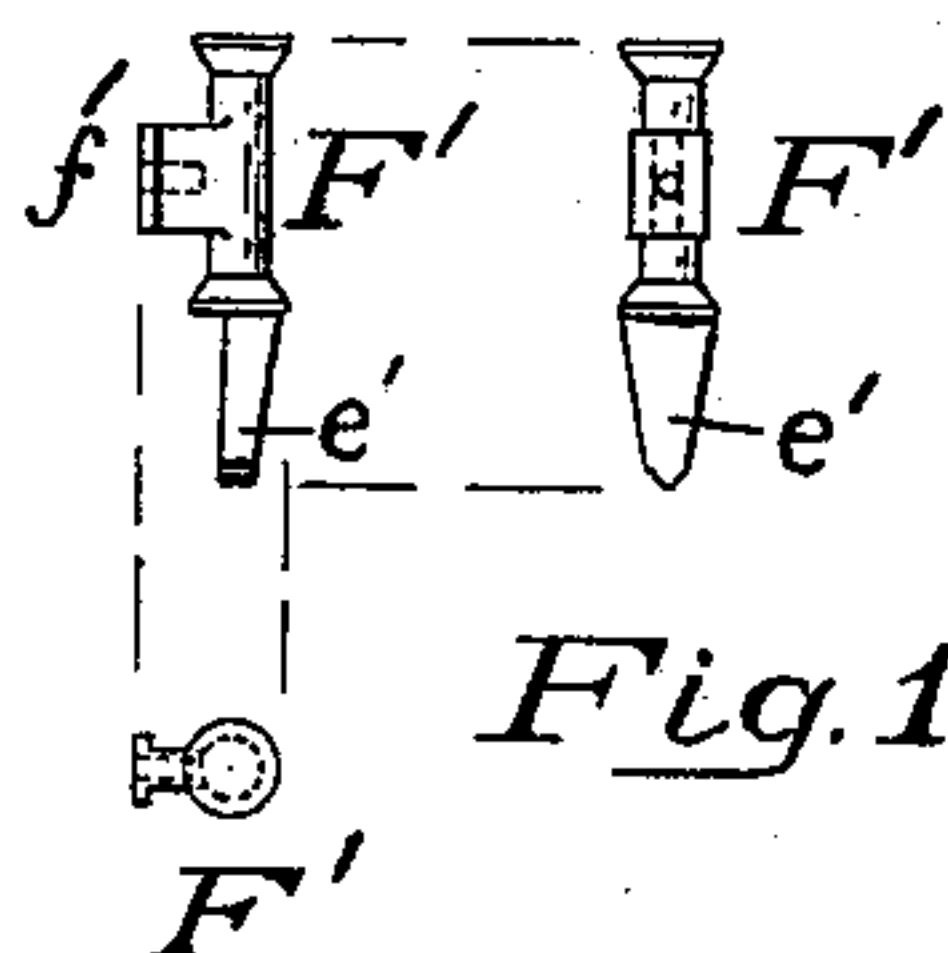


Fig. 12

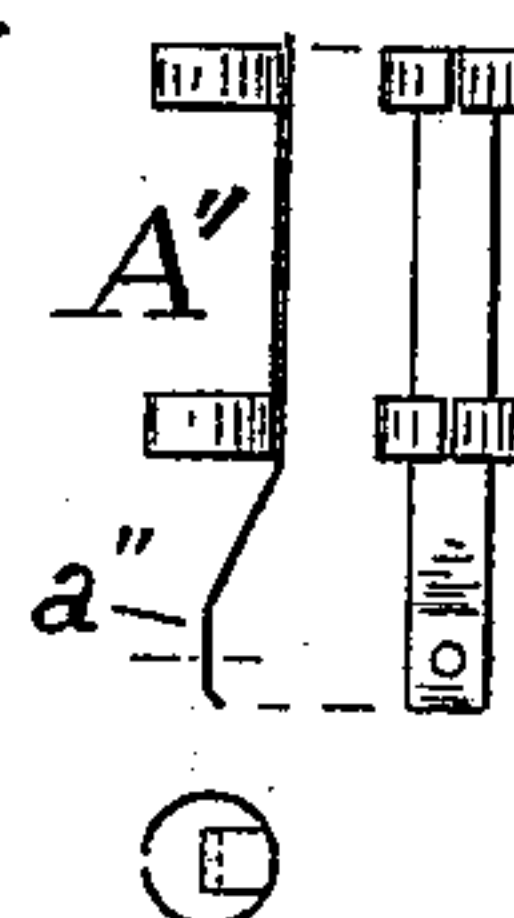
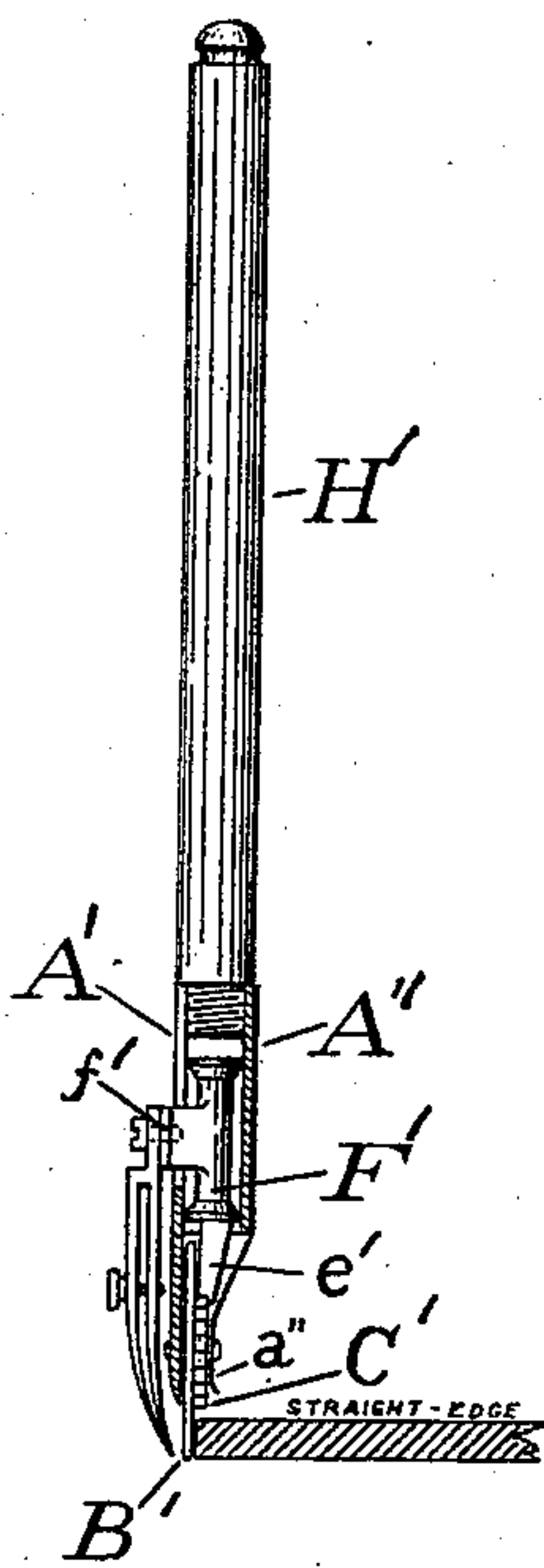


Fig. 11

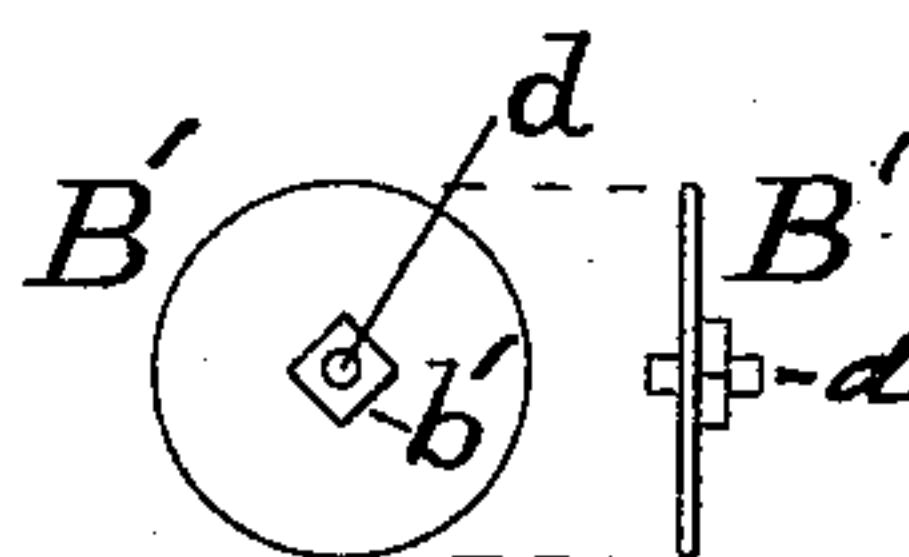


Fig. 13

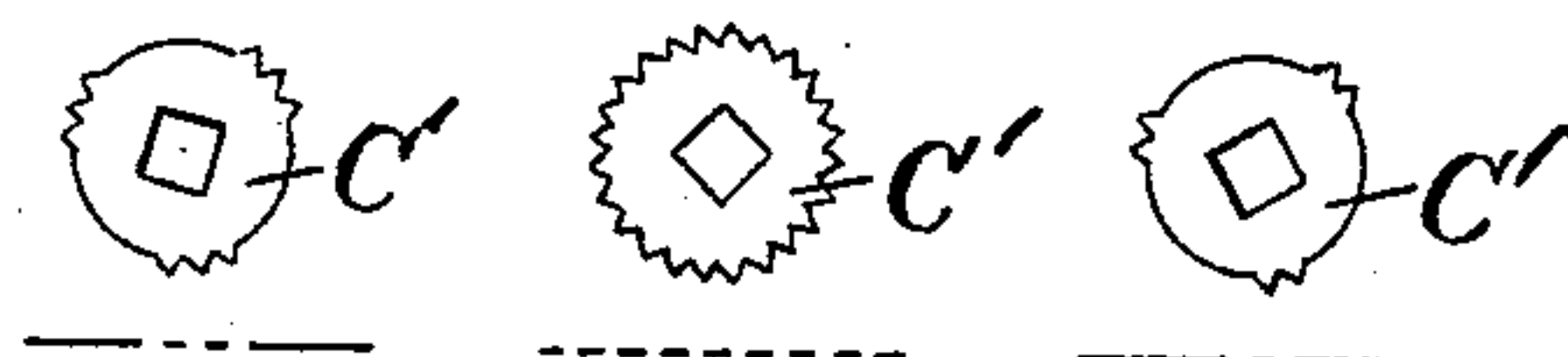


Fig. 14

WITNESSES:

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UNITED STATES PATENT OFFICE.

JAMES HARMER KNIGHT, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR, BY
MESNE ASSIGNMENTS, OF ONE-HALF TO EDWARD SWANN, OF NEW
YORK, N. Y.

INSTRUMENT FOR MAKING BROKEN LINES.

SPECIFICATION forming part of Letters Patent No. 541,553, dated June 25, 1895.

Application filed May 26, 1894. Serial No. 512,583. (No model.)

To all whom it may concern:

Be it known that I, JAMES HARMER KNIGHT, of Philadelphia, Pennsylvania, have invented a new and useful Improvement in Instruments for Making Broken Lines, of which the following is a description, referring to the accompanying drawings, which form a part of this specification.

My invention forms an improvement in that class of drawing instruments for making broken lines in which the motion of the instrument, acting through suitable mechanism, raises and drops the pen, pencil, or other marking instrument, causing it to form dots, dots and dashes, or any other desired form of broken line, according to the design of the mechanism.

By my improvement I am enabled to produce an instrument having a continuous rolling surface in contact with the paper or other material, thus giving greater smoothness of action and rendering the motion of the instrument uniform and free from jar; having a more gentle contact between the pen, pencil, or other marking instrument and the paper; obviating any snapping or throwing action of the marking instrument, which might cause blots or blurs upon the drawing; and adapted to more closely and smoothly follow the edge of French curves and capable of being used for much smaller curves, (or rather curves of much smaller radius) than is practicable with any other kind of broken-line instrument with which I am acquainted. Moreover, under my invention, the broken-line mechanism forms an attachment which may be clamped onto or removed from the pen, pencil, or other marking instrument of compasses, beam compasses, ruling devices and other forms of drawing instruments, without in any way interfering with the ordinary adjustments of the instrument, or disturbing its operation.

To all these and to certain other ends and purposes which will be hereinafter more fully explained, my invention is embodied in the apparatus and its several parts, constructed, arranged, combined, and used, substantially in the manner hereinafter described, illustrated, and claimed.

Under my invention, I provide a sliding

piece which may be clamped directly onto the drawing instrument or instruments for which it is intended. This sliding piece or carrier is mounted upon or within a handle or frame, but free to travel up and down relatively to it. To the frame I secure a contact roller preferably milled at its edge, to give better grasp upon the paper; and concentrically to this contact roller or wheel I secure toothed or serrated tripping or actuating wheels, having peripheries designed to produce the required movement of a tongue or dog upon the sliding piece or carrier secured to the marking instrument. The actuating or tripping wheel is of somewhat smaller diameter than the contact wheel, so that it does not touch the paper, and the frame or handle may be short enough to permit a straight-edge or curve to bear against the contact wheel or may be long enough to itself form the guide which rests against the straight-edge or French curve. Preferably, the point of the drawing instrument comes as close as possible to the contact wheel where it touches the paper, thus enabling the draftsman to guide the instrument against the straight-edge or curve with much greater ease and precision than is possible where the marking point trails behind at the end of a vibrating lever, as is common in some forms of broken-line instruments. The actuating or tripping wheel is detachable from the contact wheel or roller so that it may readily be removed and others of a different design substituted. A pin or a square stud upon the shaft or arbor of the contact roller, interlocking with the interchangeable actuating wheels, insures the rotation of the actuating wheel.

Such briefly, is a description of my invention in its broader aspects. Its details will be better understood by reference to the accompanying drawings which show two forms of it.

Figure 1 is a side elevation of an ordinary drawing-pen provided with my attachment. Fig. 2 is an elevation of the same, looking edgewise upon the blades of the drawing-pen. Fig. 3 is a plan or top view showing the clamp by which my attachment is secured. Fig. 4 is a view of the frame or handle. Fig. 5 is a

detail view of the tripping or actuating wheel and the clamp with its dog or tongue co-operating with the wheel. Figs. 6 and 7 are edge and face views of the contact roller or wheel. Fig. 8 shows a sliding cover which forms part of the handle of my device. Fig. 9 shows a modification of my device. Figs. 10 to 13, inclusive, are detail views of this modification; and Fig. 14 shows three designs of tripping or actuating wheels with samples of the broken lines produced by them.

Like letters of reference throughout the drawings refer to like parts.

The bar, frame or handle of that form of my device shown in Figs. 1 to 8 is indicated by A. This is provided with a slot *a* and a circular perforation for the stud or shaft that carries the contact roller B. The contact roller or wheel B is provided with two pins *c* which fit into and hold the actuating or tripping wheel C. When the wheel C has been placed in position upon the face of the contact roller B, a shouldered pin D with a milled nut E may be employed to secure it and the contact wheel to the frame or handle A.

To the upper part of the frame or bar A is attached a sliding carrier or piece F formed with a tongue *e* at its lower end, for engaging the projections or teeth of the tripping or actuating wheel C, and provided with a suitable clamp *f* by which it may be attached to the pen, pencil, or other drawing instrument, with which it is to be used. The piece or carrier F is also provided with two screws *g* extending through the slot *a* of the bar A, and securing it to the bar, while leaving it free to travel up and down the slot. The lower end of the bar A may project well below the center of the roller or contact wheel B, to rest against the edge of the triangles, straight-edge, or French curves, used to guide the instrument; but, of course should not be long enough to touch the paper. Preferably, however, I form the parts of such shape that the straight-edge or other guide may rest directly against the contact wheel or roller B as in the modification hereinafter described.

The upper end of the bar A may be formed to fit interchangeably into a longer handle or into dividers, beam-compasses or other instruments in place of the usual pen or pencil points, and the lower part may be widened out as in the figures, to protect the tripping or actuating wheel C from the fingers. The roller or contact wheel B is preferably milled on its periphery, to prevent slipping, and provided with a central flange around which the wheels C fit.

The projections or teeth on the edge of the tripping or actuating wheel C may be symmetrically or unsymmetrically shaped. If symmetrical, the instrument may be run either forward or backward with equal ease; while if unsymmetrical the incline upon one side of the teeth being less, the friction between the projections or teeth and the tongue or dog *e*

will be reduced, but the motion preferably limited to one direction. The form of wheel shown in Fig. 5 would give a series of dots equally spaced. Other forms will give other lines as clearly shown in Fig. 14. Any variety of broken lines may therefore be produced by varying the number, shape and size of the teeth and spaces.

The action of the tripping wheel and the tongue or dog *e* will be readily understood by those skilled in the art, and the advantages of my sliding action in place of a vibratory lever, will be clearly apparent. When a tooth has raised the pen or other marking instrument from the paper and passed from beneath the tongue *e*, gravity will cause the pen to fall quickly and gently back upon the paper with a directness and smoothness of action not heretofore attained in any instrument with which I am acquainted.

In the drawings I have shown my attachment as clamped onto an ordinary ruling pen. The clamp shown is of square form slotted in front to allow the passage of the adjusting screw of the pen. Against the jaws thus formed, the set-screw *h* securely clamps the under blade of the pen. To admit placing the pen, pencil or other marking instrument at various angles with the plane of the instrument, the clamp *f* may be made of one or more separate parts and secured to the sliding carrier F by a spring, hinge, or universal joint. It will be clearly seen that in any case, the usual adjustments of the pen or other instrument are not in any way interfered with by the addition of my broken-line attachment.

To afford protection to the set screw *h* and the carrier screws *g*, a sliding cover or case, as shown in Figs. 3 and 8, may be provided, which, when in place, covers the screws as shown in Fig. 2.

The modification of my device shown in Figs. 9 to 14, inclusive, is very much the same in the function and operation of the parts, the chief difference being in the design and details of the several features. The usual handle of the pen is omitted and the frame A', provided with a handle H'. This is of course preferable, as the usual handle of the pen moves up and down with the pen, rendering it necessary to hold the instrument by means of the frame or handle A', as already described. In the modification, the carrier F' takes the form of a loose spool or plug which travels up and down within the frame A', which in this case forms an inclosing case provided with a slot *a'*. A projection *f'* extends from the carrier F' through the slot and forms the clamp or means for attachment to the pen. The contact wheel or roller B' is provided with a rectangular stud *b'* and a projecting arbor, or pin *d*, as clearly seen in Fig. 13. The actuating or tripping wheels C' are provided with corresponding rectangular perforations at their centers, which fit the stud *b'* and take the place of the pins *c* and per-

forations heretofore described. The pin or arbor, *d*, of the contact roller B' fits on one side into the hole *b''* in the lower end of the frame or case A'. At the other side of the wheel a spring clamp A'' secured to the case A' and provided with a perforated spring tongue *a'*, forms the bearing for the pin or arbor of the contact roller. With this construction, it is only necessary to raise the tongue *a''* and remove together the wheels B' C'; when the actuating wheel may be changed and the parts returned to their place in order to give any desired form of broken line.

In Fig. 9 one of the great advantages of my invention is especially apparent. The parts are so formed that the straight-edge rests directly against the contact wheel or roller B', and the point of the pen is immediately beyond it, in the axial plane of the instrument perpendicular to the line of motion, that is to say, perpendicular to the wheel B'. This enables the draftsman to employ the instrument with much greater ease and precision than would otherwise be possible. Indeed many forms of broken-line instruments with which I am acquainted, are usually employed only for straight lines, because the manipulation is too difficult or too inaccurate in curve work.

I have now set forth two modifications of my device. I have purposely omitted all mention of many other modifications and variations which may be made, both in the arrangement and in the details of the several parts, because to enumerate them would obscure rather than make clear the more essential features of my invention.

I claim, however, and desire to secure by these Letters Patent of the United States, together with all such modifications as may be made by mere "skill in the art" without departing from the principles involved, and with only the limitations and restrictions as hereinafter expressed or necessarily implied, the following:

1. A broken-line attachment for drawing instruments having a contact roller or wheel and a separate and detachable tripping or actuating wheel, a movable carrier or piece

actuated by the said wheel, and a clamp, substantially as and for the purposes set forth.

2. As an improvement in an instrument for making broken-lines and in combination with the other operating parts, a contact roller or wheel, a tripping wheel driven thereby a movable carrier piece, or jigger, actuated by the said tripping wheel, and a marking instrument mounted on, or moving with, the said carrying piece or jigger substantially as set forth.

3. As an improvement in an instrument for making broken lines, a contact roller or wheel having a continuous and preferably milled contact edge, a tripping or actuating wheel and a carrier provided with a tongue co-operating with the said tripping wheel, for giving broken-line motion to the pen, pencil, or other marking instrument, substantially as for the purposes set forth.

4. The combination of a suitable mechanism for producing a vertical reciprocating motion and actuated by contact with the paper through a roller or contact wheel, with a pen, pencil, or other marking instrument operating at the side of the said roller or contact wheel in a plane with or containing the axis thereof, substantially as and for the purposes set forth.

5. In an instrument for making broken lines, in combination, a sliding carrier, means for securing a pen, pencil, or other marking instrument, and a tripping or actuating wheel, engaging with a dog or tongue on the carrier, substantially as and for the purposes set forth.

6. In an instrument for making broken lines, a tripping or actuating wheel provided with projections or teeth, in combination with a sliding carrier having a tongue actuated by gravity against the said tripping or actuating wheel, substantially as and for the purposes set forth.

In testimony whereof I have hereunto set my hand this 19th day of May, 1894.

JAMES HARMER KNIGHT.

Witnesses:

PERCY MCGEORGE,
C. S. CHRISMAN.