(No Model.) 2 Sheets—Sheet 1.

# J. GARDAM.

## DRAWING INSTRUMENT FOR SECTION LINING.

No. 304,521. Patented Sept. 2, 1884.

Fig. 1.

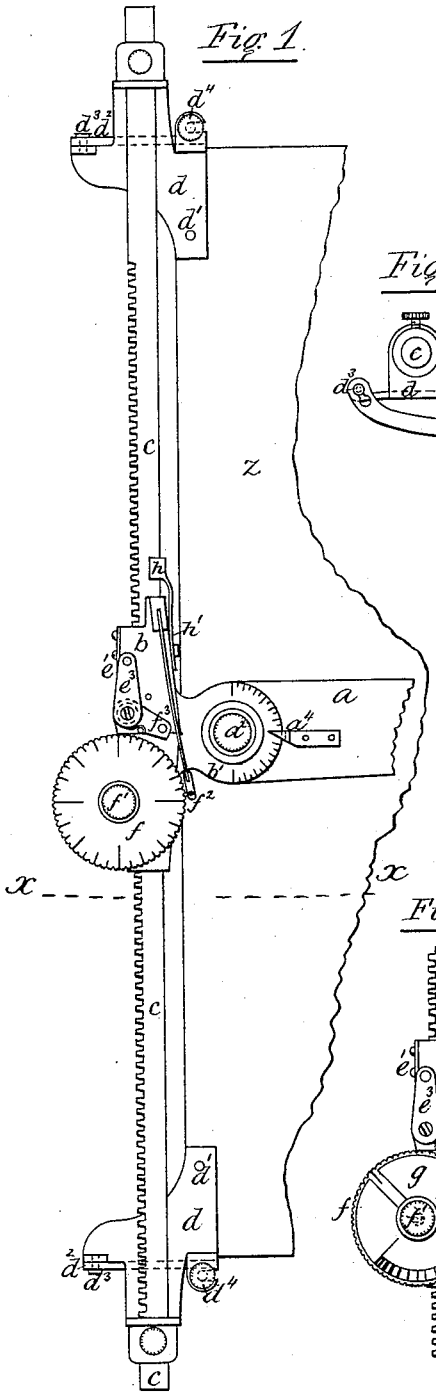


Fig. 2.

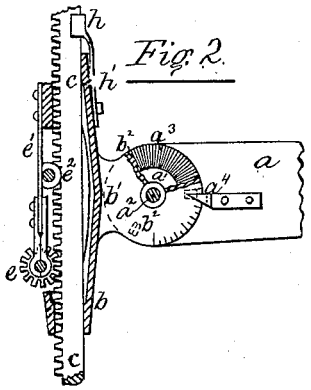


Fig. 4.

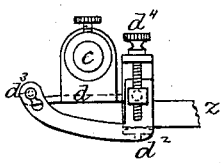


Fig. 3.

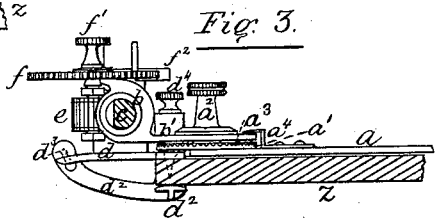


Fig. 5.

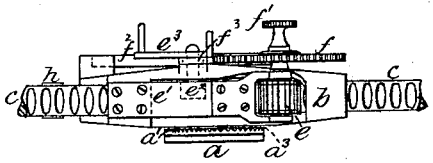


Fig. 6.

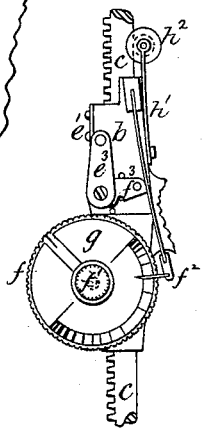


Fig. 13.

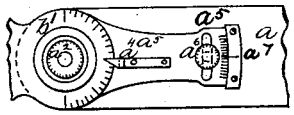
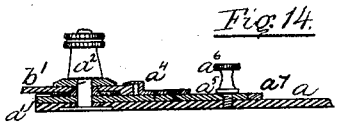


Fig. 14.



Witnesses.
H. D. Williams
E. G. Baker.

Joseph Gardam.
Inventor.
per Alfred Sherbrooke atty.

(No Model.) 2 Sheets—Sheet 2.

# J. GARDAM.

## DRAWING INSTRUMENT FOR SECTION LINING.

No. 304,521. Patented Sept. 2, 1884.

Fig. 7.

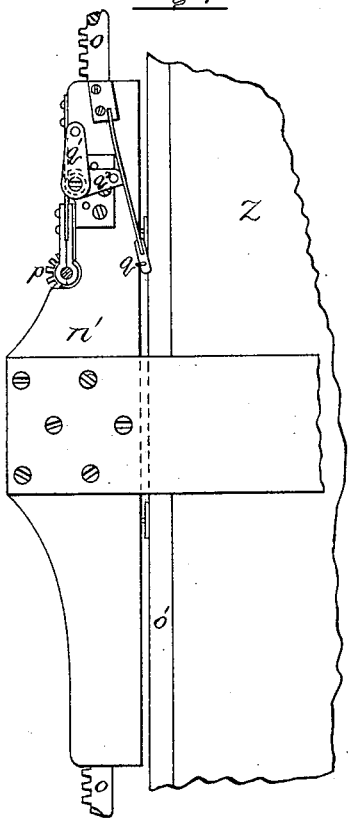


Fig. 10.

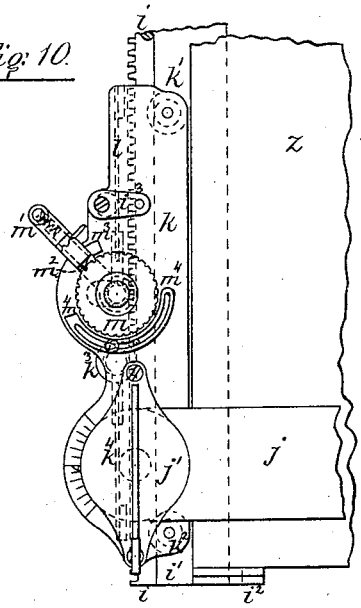


Fig. 11.

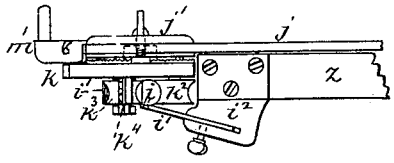


Fig. 8.

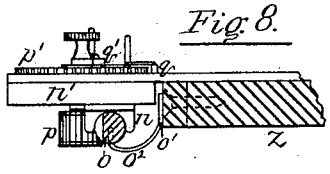


Fig. 12.

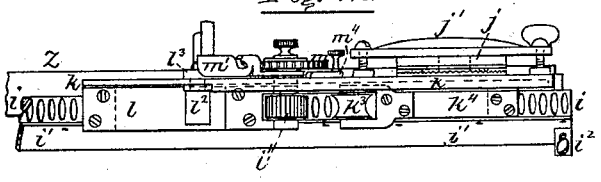
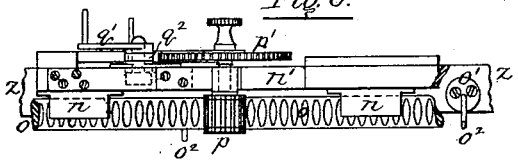


Fig. 9.



Witnesses.
H. D. Williams
E. G. Baker.

Joseph Gardam.
Inventor.
per Alfred Theobald. Atty.

# UNITED STATES PATENT OFFICE.

JOSEPH GARDAM, OF BROOKLYN, NEW YORK, ASSIGNOR OF TWO-THIRDS TO WILLIAM GARDAM AND FREDERICK W. GARDAM, OF SAME PLACE.

## DRAWING INSTRUMENT FOR SECTION-LINING.

SPECIFICATION forming part of Letters Patent No. 304,521, dated September 2, 1884.

Application filed November 2, 1882. (No model.)

*To all whom it may concern:*

Be it known that I, JOSEPH GARDAM, of Brooklyn, county of Kings, State of New York, have invented certain new and useful Improvements in Drawing-Instruments for Section-Lining, &c., of which the following is a specification.

The object of this invention is the construction of an instrument by means of which section-lining, shading, and laying off ordinary mechanical drawings may be greatly facilitated; and it consists in such an arrangement and combination of simple mechanical devices adapted to be applied to a T-square made specially to work in or on a guide fixed to the drawing-board, or to ordinary T-squares, adapting the same to be used in combination with a fixed guide, or, as ordinarily, against the edges of the drawing-board itself.

My invention and various modifications of the same will be fully understood by reference had to the accompanying drawings, forming part of this specification, in which—

Figure 1, Sheet 1, is a plan view showing the instrument clamped on the end of a drawing-board, the same being so constructed that, upon the removal of the clamps, it may be set in any position on the board. Fig. 2, Sheet 1, shows part of the same in section. Fig. 3, Sheet 1, is an end view taken on line *x x*. Fig. 4, Sheet 1, is an end view of the clamping device. Fig. 5, Sheet 1, is a front view of the operating mechanism Fig. 6, Sheet 1, shows the application of removable scales for cylindrical shading. Fig. 7, Sheet 2, shows my improvements applied to an ordinary T-square. Fig. 8, Sheet 2, is an end view, and Fig. 9, Sheet 2, is a front view, of the same. Fig. 10, Sheet 2, illustrates certain modifications applied to a T-square adapted to work on a guide fixed to the drawing-board. Fig. 11, Sheet 2, is an end view of the same, and Fig. 12, Sheet 2, is a front view. Fig. 13, Sheet 1, is a plan view of a means for obtaining fractions of the divisions of the scale on the protractor-joint, and Fig. 14 is a section of the same.

Referring to Fig. 1 and the allied views, *a* represents part of the T-square blade, and *b* the head, fitted to slide on the rod *c*. The blade and head *b* may be rigidly connected together; but in most cases I connect them together by means of a protractor-joint of novel construction, whereby the blade may be readily set at any desired angle to its direction of travel on the rod *c*, and rigidly clamped in position. The head *b* has a flat circular bearing-plate, *b'*, and the blade *a* is provided with a similar bearing-plate, *a'*, which are connected together by means of the central binding-screw and nut, $a^2$. One of these flat circular bearing-plates is provided with radial grooves corresponding in number to the equal divisions by degrees of a circle, and the other one is provided with one or more pins adapted to fit into the radial grooves, so that when the blade is approximately set at the desired angle, and the bearing-plates brought together by tightening the binding-nut, the pins, in passing into the desired groove, cause the blade to assume accurately the desired angle and hold the blade firmly. In the drawings the plate *a'* on the blade *a* is shown provided with the radial grooves $a^3$, and plate *b'* on the head *b* with the registering-pins $b^2$. Their relative positions may be reversed, or both the plates may have radial grooves adapted to fit, the one set in the other. The upper circular bearing-plate has impressed on it a protractor-scale, and the blade *a* is provided with the index $a^4$. The plate *a'* has a divided arc, $a^5$, for fine adjustment, and is clamped to the blade by screw $a^6$, opposite the index-marks $a^7$. (See Figs. 13 and 14.)

As before mentioned, the head *b* slides on the rod *c*, which rod has detachably secured to its ends the standards *d d*, having flat bases and provided with sharp-pointed studs *d' d'*, which pierce the surface of the drawing-board *z*, or paper, and hold the instrument firmly in any desired position. To clamp the same on the edge of the board, the jaws $d^2$ $d^2$ are hooked on the headed studs $d^3$ $d^3$ on the sides of the standards, and the thumb-screws $d^4$ $d^4$ passed into right-angle ears on the standards, through open slots therein. These screws fit into swiveled nuts on the jaws $d^3$ $d^3$, as clearly shown at Fig. 4, and the edge of the drawing-board or other object on which the instrument

is to be clamped is gripped between the jaws $d^3$ $d^3$ and the flat bases of the standards $d$ $d$.

The foregoing describes the instrument in its simplest form. For section lining and spacing, I form in the rod $c$ a series of rack-teeth, and connect to the head $b$ the pinion $e$, which has bearings in the spring $e'$, whereby it is kept up snugly to the rack on the rod, and all back-lash avoided. This spring $e'$ also admits of the pinion $e$ being moved away clear of the rack to allow the head $b$ to be freely moved on the rod $c$. The small cam $e^2$, connected to or forming part of the spindle of the lever $e^3$, acts against the inner side of the spring $e'$ when the lever is partly rotated, to move the pinion out of the rack. On a conical shoulder of the spindle of the pinion $e$ is placed the indicating-disk $f$, held thereto by means of the thumb-nut $f'$. The edge of this disk $f$ is notched, the number of said notches bearing such relation to the pitch of the rack and pinion that when the pinion, with the disk, is rotated each notch moved will indicate a certain fraction of some unit of measure, and thereby indicate the distance the head $b$ and blade $a$ are moved. The ready clamping of the disk $f$ to the spindle of the pinion $e$ enables the edge of the blade to be set to any given line, and the zero-point on the disk to be set opposite the index, to measure or mark a line any required distance from said given line. The spring-index $f^2$ has a tooth to fit into the notches in the disk $f$, so that counting the number of the notches in the edges of the disk moved over it, or the figures impressed on the face of the disk, determines the distance the blade is moved. The lever $f^3$, pivoted on the stem of the lever $e^3$, or on a stud bearing on the head $b$, is for the purpose of pressing and holding the spring-index $f^2$ away from the disk $f$.

Instead of impressing the divisions on the disk $f$, they may be marked on circular pieces of card or other suitable material, which are adapted to be clamped on the top of the disk by means of the thumb-nut $f'$, as shown at Fig. 6. The circular card $g$ is slotted to its center, so as to pass over the screw and under the thumb-nut $f'$. These cards are marked, as shown, with scales of varying spaced lines corresponding to the relative spacing of lines, to properly indicate cylindrical shading, the angular space occupied by the scale on the card $g$, and its movement before the index being a measure of the distance the square will move on the board. The card shown is divided to shade a cylinder of one inch diameter. Two or more scales may be marked on each card, and one within the other; in fact, various uses of such a detachable indicating and measuring device will suggest themselves to the user.

It will be seen that the square blade $a$ may be raised off the board by turning the whole of the movable parts on the rod $c$ as a center.

To provide for wearing of the bearings of the head $b$ on the rod $c$, and prevent consequent play of the blade $a$ from this cause, I apply to the head $b$ a yielding pressure bearing adapted to hold the sides of the bearings of the head always against the rod, in such direction as to keep the blade $a$ firmly in the position the pressure thereon, in using the instrument, tends. This yielding-pressure bearing is shown in Figs. 1 and 2 as consisting of a shoe, $h$, secured on the end of spring $h'$, secured to the head $b$, and at Fig. 6 is shown a roller, $h^2$, substituted for the shoe $h$.

In the modification shown in Figs. 10, 11, and 12, the rack guide-rod $i$ is secured to the plate $i'$, which is held in the slotted holders $i^2$, one secured to each end of the board $z$. The slots in the holders $i^2$ are inclined, (see Fig. 11,) thereby providing a means for setting the rod $i$ level with the s
the board $z$, and adjusting the blade of the square so as to lie thereon without undue strain. The joint connecting the blade $j$ to the sliding head $k$ is provided with radial protractor-grooves, as before described; but they are here shown held together by means of the clamping bridge-piece $j'$. The head $k$ has guide-rollers $k'$ $k^2$, arranged to bear on one side of the rod $i$, and the roller $k^3$, journaled in the end of the spring $k^4$, and arranged to bear on the other side of the rod $i$. The spring $l$, which carries the pinion $l'$, is made to hold the pinion away from the rack-teeth, when in its normal position, said pinion being pressed into the rack-teeth by the cam $l^2$ on the shaft of the lever $l^3$, acting on the outside of the spring $l$. A device for actuating the indicating-disk $m$ on the spindle of the pinion $l'$ a determined distance consists of the lever $m'$, provided with a spring-acting dog or pawl, $m^2$, adapted to be reversed so as to catch into the notches of the disk $m$, and feed the body along the rod in either direction, or be set so as to be held entirely clear of the disk. This lever $m'$ comes in contact with a fixed stop, $m^3$, when moved in one direction, and against the adjustable stop $m^4$, when moved in the opposite direction, the angular space it is allowed to play in governing the number of notches on the disk it feeds for each movement between the stops.

In the application of my improvements in drawing-instruments to ordinary T-squares, open bearings $n$ $n$ are secured to the under side of the head $n'$ of the square. These open bearings rest on the guide-rod $o$, which is fastened to the strip of wood $o'$ by means of the brackets $o^2$, and the strip of wood $o'$, is secured by screws to the edge of the drawing-board. The T-square may be used in this simple form, the rod $o$ forming a more perfect guide therefor than the plain edge of ordinary drawing-boards; but I further apply my invention to the head $n'$ by securing thereto the spring-acting pinion $p$, provided with the indicating-disk $p'$, the spring-index $q$, and the throw-out levers $q'$ $q^2$, arranged, respectively, to move the pinion $p$ away from the rod $o$,

which in this case has rack-teeth formed thereon, and to move the index $q$ away from the notched disk $p'$.

It will be seen that these attachments to the head of an ordinary T-square do not interfere in the least with the ordinary use of the same, and that a T-square provided with such improvements may be readily moved from one board to another, each of the boards being provided with a rack guide-rod secured to its edge or edges.

Having now described my invention, what I claim, and desire to secure by Letters Patent, is—

1. In combination, the rod $c$, T-square $a$ $b$, and standards $d$ $d$, provided with the pointed studs $d'$ $d'$, substantially as and for the purpose set forth.

2. In combination, the rod $c$, standards $d$ $d$, provided with pointed studs $d'$ $d'$, the clamping-jaws $d^2$ $d^2$, and T-square adapted to slide on the rod $c$, substantially as set forth.

3. The T-square head $b$, carrying the spring-acting pinion $e$, in combination with the rack-rod $c$, substantially as described.

4. In combination, the rack-rod $c$, the sliding head $b$, the spring-acting pinion $e$, and the cam $e^2$, substantially as set forth.

5. The rack-rod $c$, the sliding head $b$, the pinion $e$, provided with indicating-disk $f$, the spring-index $f^2$, and the lever $f^3$, substantially as set forth.

6. The combination of the detachable scale-cards $g$ with the disk $f$, the index $f'$, pinion $e$, rack-rod $c$, and sliding head $b$, of a T-square, substantially as set forth.

7. A protractor-joint having three hundred and sixty radial grooves, or a number of equidistant grooves corresponding to equal divisions of three hundred and sixty, by means of which the moving parts may be readily set and rigidly held in any desired angular position, substantially as set forth.

8. In combination, the bearing-plates $b'$ and $a'$, held together by means of radial grooves, the divided arc $a^5$, forming part of the bearing-plate $a'$, and the index-marks $a^7$, substantially as and for the purpose set forth.

In witness whereof I have hereunto set my hand at New York, county and State of New York, this 1st day of November, 1882.

JOSEPH GARDAM.

Witnesses:
H. D. WILLIAMS,
E. G. BAKER.