

Jan. 16, 1940.

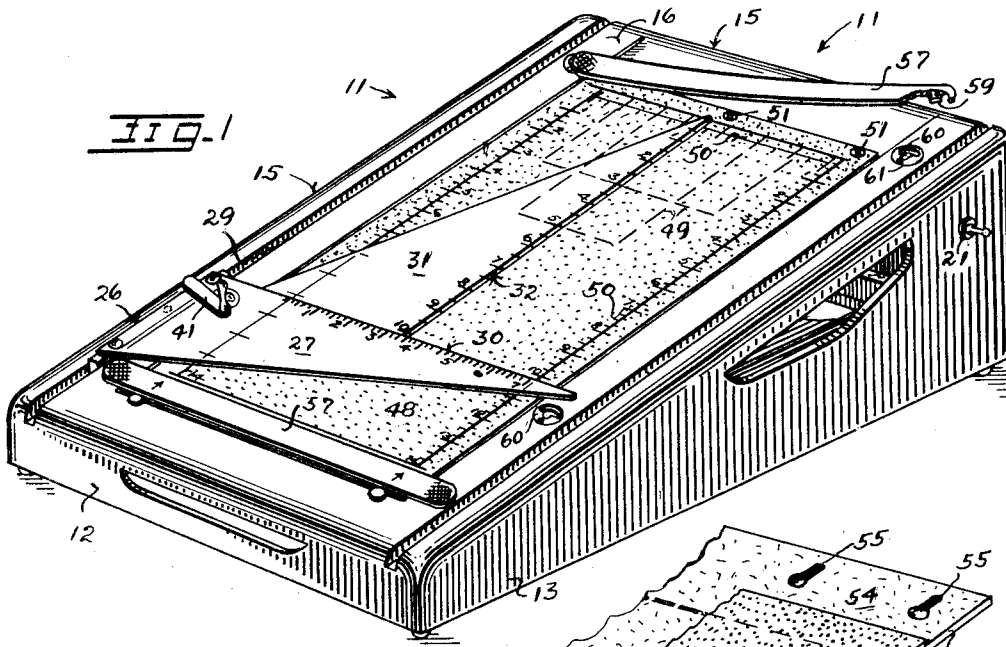
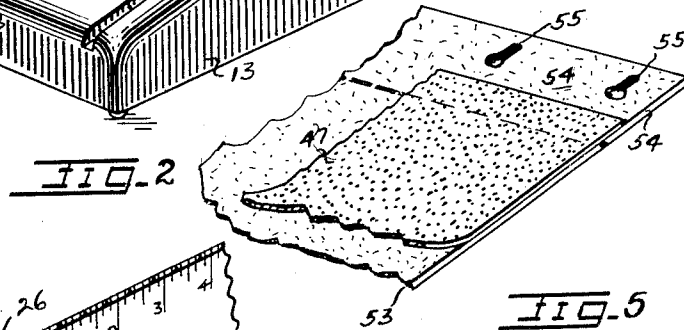
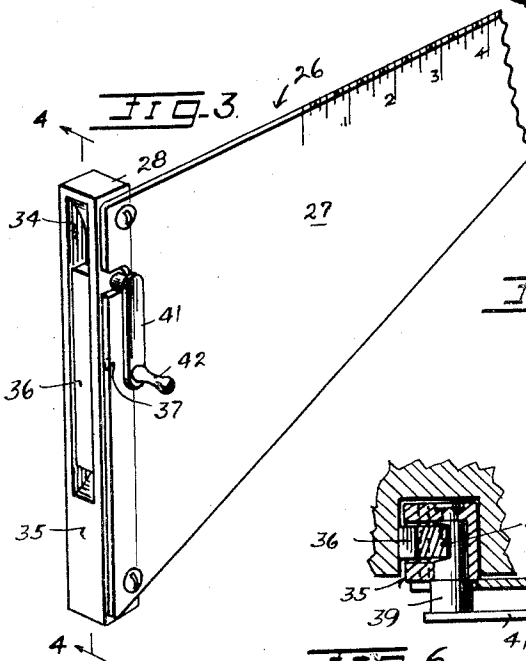
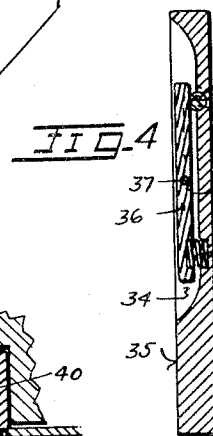
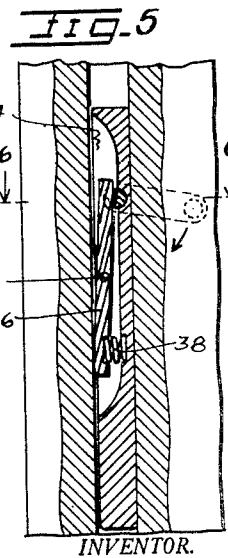
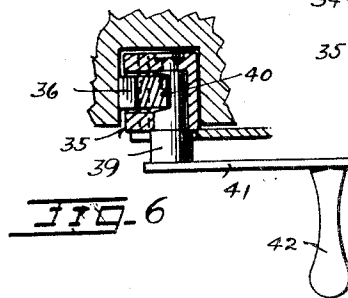
F. NIGRA

2,187,574

TRACING APPARATUS

Filed Dec. 3, 1937

2 Sheets-Sheet 1



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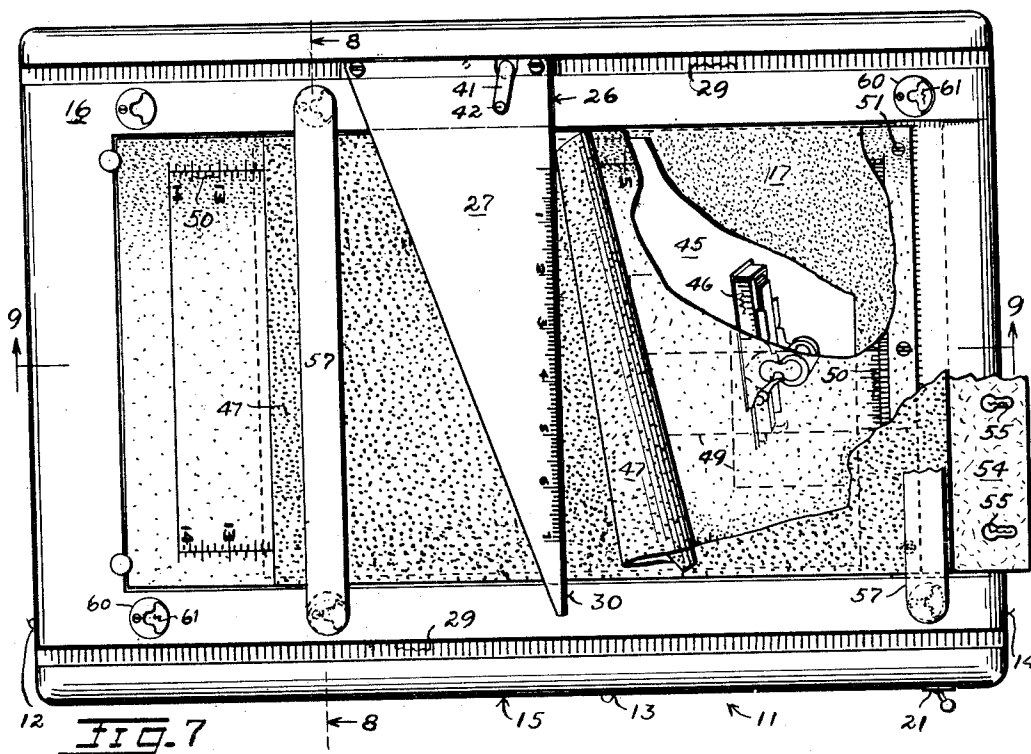
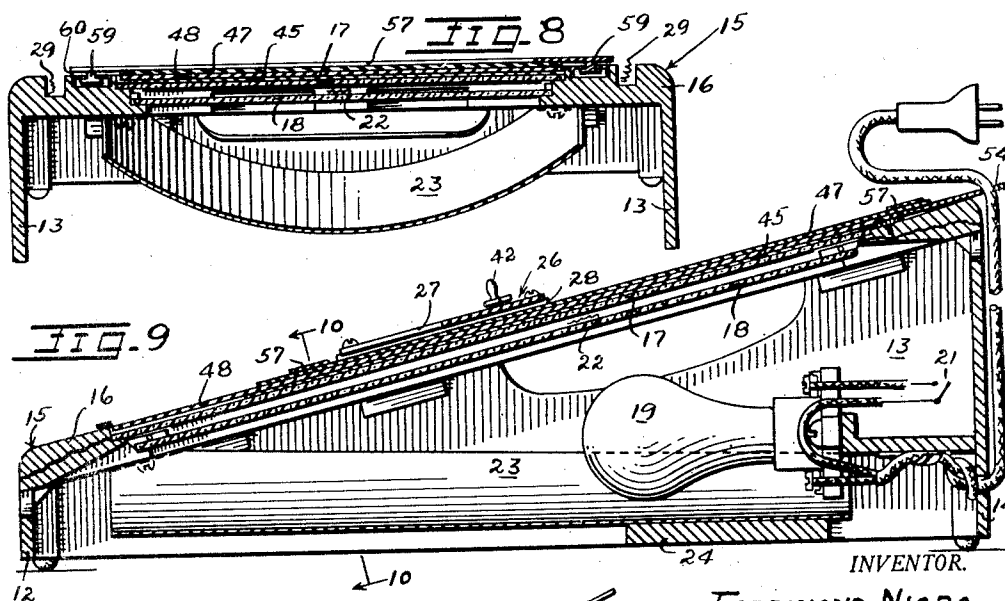
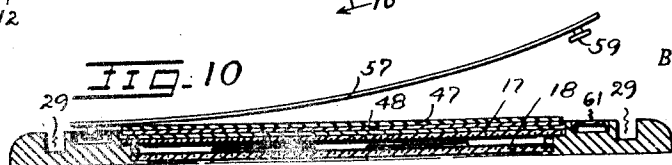
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2,187,574

TRACING APPARATUS

Filed Dec. 3, 1937

2 Sheets-Sheet 2



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TRACING APPARATUS

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Application December 3, 1937, Serial No. 177,888

5 Claims. (Cl. 33—76)

The invention relates to unitary drawing apparatus which is particularly adapted for use in copying drawings and the like by tracing them while illuminating the drawings through the sheet on which they occur.

A principal object of the invention is to provide a tracing apparatus which is particularly adapted for providing drawings and line work on stencil sheets for use in duplicators.

Another object is to provide an improved releasable locking of a T-square member of the apparatus in an adjusted position on the drawing board of the apparatus.

A further object of the invention is to provide an improved backing plate as part of the apparatus and for interposition between the original and copy sheets.

Yet another object is to provide an improved means for releasably securing sheets over the drawing surface of the apparatus.

The invention possesses other objects and features of advantage, some of which, with the foregoing, will be set forth or be apparent, in the following description of a typical embodiment thereof, and in the accompanying drawings, in which:

Figure 1 is perspective view showing a drawing board unit embodying the features of the present invention.

Figure 2 is a fragmentary perspective view of a stencil sheet mounted on a usual backing sheet therefor and adaptable to mounting on the present unit for the cutting of the stencil.

Figure 3 is an enlarged perspective view of a T-square member of the apparatus.

Figure 4 is a fragmentary longitudinal section through the head of the T-square element of Figure 3 and showing a locking means of the latter in inoperative condition.

Figure 5 is a fragmentary view similar to Figure 4, but including a portion of the drawing board, the locking means of the T-square element being shown as operative with respect to a groove of the board which receives the head of the element.

Figure 6 is an enlarged fragmentary section at 6—6 in Figure 5.

Figure 7 is a plan view of the apparatus arranged for cutting a stencil, a portion of the stencil being rolled back and certain accessory elements being broken away.

Figure 8 is a sectional view taken at 8—8 in Figure 6 and at right angles to the plane of the drawing surface.

Figure 9 is a longitudinal section taken at 9—9 in Figure 7.

Figure 10 is a fragmentary section similar to Figure 8, a paper-locking clamp of the assembly being partially disengaged.

The features of the present invention are particularly disclosed as associated with a portable drawing board unit 11 wherein a front wall 12 and side walls 13 and a rear wall 14 are mutually parallel and support a top 15 which provides a drawing board over which drawing and tracing operations may be performed. The bottom edges of the various walls define a plane which is perpendicular to the walls and may be referred to as the base plane of the unit, and said walls are unitarily connected at mutually coterminous ends thereof to provide a continuous rectangular apron beneath the top 15. As shown, the top 15 makes an angle of the order of fourteen degrees with the base plane for facilitating the use of the top.

As shown, the top 15 comprises a flat rectangular frame 16 which mounts upper and lower glass panes 17 and 18 in its opening in mutually spaced relation and parallel to the plane of the frame 16. For a reason to be hereinafter brought out, the top surface of the upper pane 17 lies slightly below the plane of the frame top face. Preferably, and as brought out in Figures 8 to 10 inclusive, the opening of the frame 16 is stepped inwardly from its top to provide transversely spaced seats for the panes 17 and 18 whereby the latter may be supported in the relation shown.

An electric lamp 19 is mounted within the space defined beneath the top 15, and its energizing circuit conveniently includes a control switch mounted on a side wall 13 and indicated by the numeral 21; the lamp 19 is lit when a tracing is to be made with the apparatus. It will be noted that the spacing of the panes 17 and 18 provides a dead-air space 22 between them, which space is designed to act as a heat insulation means with respect to the pane 17.

A suitable reflector 23 is disposed in the casing below the lamp 19 for upwardly reflecting the downwardly radiated light from the lamp toward the panes 17 and 18; the reflector 23 is shown as cylindrically concave, and its form is such as is calculated to provide an even illumination of the panes from the lamp. The forward end of the reflector 23 may be secured directly to and beneath the top frame 16, while its rear end may be supported on a cross-member 24 which is fixed to and between the side walls 13 generally rearwardly of the reflector. Preferably, and as shown, the intermediate top edge portions

of the various walls are notched out to provide for a free circulation of air beneath the bottom pane 18 as an aid to keeping the panes as cool as possible; such circulation, it will be understood, is aided by the obliquity of the drawing top of which the panes provide the interior portion.

A straight-edge member 26 for use in a manner corresponding to that of a draftsman's T-square is adjustably and removably mounted on the top 15 to extend its blade portion across the working surface of the top. Preferably, and as shown, the member 26 comprises a right triangle 27 of transparent Celluloid or the like fixed to and against an elongated head block 28 extending along one of its sides. Mutually parallel grooves 29 of uniform cross-section are provided in and along the sides of the top frame 16 for selectively receiving the head block 28 as a guiding means therefor, the head block having a uniform cross-section which is complementary to that of the grooves. The triangle edge 30 which is perpendicular to the block 28 comprises the straight-edge of the T-square and is arranged to receive an edge of a free triangle 31 against it. The edge 30 and an edge 32 of the triangle 31 are suitably graduated to facilitate their cooperative use in locating a particular point over the drawing surface.

Means are provided for locking the member 27 in adjusted position, said means being cooperative between a groove side and the head 28, and being carried by the head. By particular reference to Figures 3 to 6 inclusive, it will be noted that a recess 34 extends into the head block 28 from a face 35 thereof which is arranged to be in opposition to the aforesaid groove side. An elongated locking member 36 is disposed in the recess 34 longitudinally thereof, and is immediately pivoted on a pivot pin 37 extending transversely through it and the block. A compression spring 38 is operatively interposed between one end of the member and a seat at the bottom of the recess 34 to normally urge a disposal of that end of the member outwardly of the recess and against the opposed groove side to frictionally lock the head in set position in the groove; the locking member is shown as being operative in Figures 5 and 6 and 7.

A cam means engages the other end of the member 36 at the same side thereof as the spring 38 for actuation to rock the member 36 out of engagement with the opposed groove side, and so free the straight-edge member 26 for adjustment along the working face of the apparatus. As particularly shown, a crank shaft 39 extends transversely through the block 28 adjacent the bottom of the recess 34, and a segmental notch 40 is provided in the otherwise cylindrical shaft 39 opposite the member 36 to normally receive the end of the latter by reason of the action of the spring 38 whereby the member 36 is then operative as a locking means for the T-square 26. If, however, the shaft 39 is rotated to engage its cylindrical surface with the end of the member 36, the latter is arranged to be swung to an inoperative position, as is the case in Figures 3 and 4. The shaft 39 carries a crank arm 41 which is operative in front of the square blade 27 and carries a knob 42 for facilitating its manipulation.

When the member 36 is in locking position, the crank arm 41 is preferably directed inwardly and across the drawing surface in the general direction of the edge 30 of the blade 27. With such an arrangement, a push on the knob 42 in either

a forward or rearward direction along the drawing surface is arranged to release the T-square 26 and simultaneously move it in the direction of the push; in this manner, but one hand need be applied for adjusting the position of the square along the guiding and positioning groove 29. Also, with the opposite sides of the grooves 29 mutually parallel, as shown, a person may move the knob 42 to withdraw the member 36 and then remove the latter member from its mounted position in the groove merely by lifting it out of the groove by pulling upwardly on the knob 42.

While the apparatus now described may be generally used either for drawing or tracing, the same is further arranged for tracing or drawing designs on a stencil sheet for use in a duplicator of the mimeograph type, the operation involving the cutting of a normally impervious coating on the stencil sheet by means of a stylus and being well known. Since a sheet 45 containing a drawing 46 to be copied may be wrinkled or have creases or be smaller than a stencil sheet 47 in which a copy of the drawing 46 is to be cut, it is usually not feasible to directly dispose the stencil sheet on the "copy" sheet 45, and a transparent sheet 48 of a hard and flexible material such as Celluloid is preferably disposed between the sheets 45 and 47 to provide a firm and even backing for cutting operations on the stencil sheet 47. The backing plate 48 is large enough to extend beyond all edges of the pane 17 whereby its edge portions may rest against the top frame 16, and preferably has its upper face ground whereby it may frictionally engage the under side of the paper to be drawn on against the slippage of the latter under the urge of a marking implement, and may also operate to further diffuse the light for tracing.

Aside from its use as a backing plate for a stencil or other sheet to be drawn on, the sheet 48 may be provided with special guide lines 49 delineated thereon, and is also provided with various transverse and longitudinal scales 50 which may, for instance, locate the lines of typewritten matter for the length of a sheet or the distance of a typewriter letter from a side margin of the sheet. By reason of the latter use of the backing plate 48, the same may, on occasion, be referred to as a graphic screen. Preferably, and as shown, the upper end of the backing plate 48 is fixed to and against the face of the rearward cross member of the top frame 16, and the upper face of the pane 17 is countersunk below the upper face of the frame 16 only just enough to accommodate a "copy" sheet 45 between it and the sheet 48 when the latter rests in flat condition against the top frame 16; in this manner, the backing plate is not distorted in use over a sheet 45 of average thickness. As shown, screws 51 having their heads countersunk in the plate, fix the plate to the frame 16.

When a stencil sheet 47 is originally furnished for cutting an impression in its coating, it is adhesively secured at one end to a more or less opaque sheet 53 which is arranged to be utilized as a backing sheet in a cutting of the stencil by typewriter type or in making an original drawing thereon; the arrangement is illustrated in the fragmentary showing of Figure 2. As is usual, the sheet 53 is scored for tearing off just below its line of adhesion to the stencil sheet whereby the latter may remain attached to a strip portion 54 of the sheet 53 when the remainder of the sheet is detached. The strip 54 extends beyond the upper stencil end and is provided with suit-

able perforations 55 for receiving pins or buttons or hooks by which that end of the stencil may be secured in place on a duplicating machine.

When the present apparatus is to be used, the removable portion of the stencil backing sheet 53 is torn off, or is bent back at the tearing line to extend under the strip 54, to facilitate the functioning of the backing plate 48 of the apparatus as a graphic or reference screen for guiding the operator in locating work on the stencil sheet 47, and the forward (severance) edge of the strip 54 may be brought against the straight upper edge of the backing plate 48 for definitely positioning the stencil sheet with respect to the backing plate, in this manner, the mounting of successive stencil sheets in corresponding positions with respect to the plate 48 is facilitated.

While the showings of Figures 7 and 9 assume that the lower portion of the sheet 53 has been torn away, it will be understood that this portion might be retained and doubled back under the strip 54, whereby the bent-back portion may be subsequently utilized behind the stencil sheet should it be desired to further cut the stencil in a typewriter or otherwise after the present apparatus has been used. To permit the foregoing mounting of the backing sheet 53 in the present apparatus, the top face of the upper cross-member of the top frame 16 is appropriately sloped forwardly and downwardly from the top plane of the frame, as is indicated in the drawings.

Elements 57 are provided and utilized for clamping the stencil sheet 47, or another sheet, in flat and stretched condition over the backing plate 48 of the apparatus in the described position. As shown, the elements 57 comprise flat strips of spring material and are normally bowed transversely thereof whereby the elements are arranged to be flattened out against a sheet to be secured for resiliently clamping the sheet in place over the plate 48. Headed pins 59 extend transversely from each clamp 57 at its sheet-engaging side for the simultaneous engagement of their heads behind plates 60 fixed to the frame at opposite sides thereof, whereby to secure the flattened-out clamp in its operative position.

Each of the pin-engaging plates 60 is provided with a keyhole slot 61 therethrough such that the larger portion of the slot will freely receive the head of a pin transversely therethrough for the disposal of said head behind the plate when the pin shank extends through the narrow part of the slot. The slots 61 which are to receive the pins of a given clamp 57 are similarly directed and are spaced as the pins 59 of the clamp; in this manner, a clamp which has been manually flattened out with its pin heads inserted through the slot may be shifted in its plane and longitudinally of the slots to dispose the pin heads behind the plates 60 for their frictional retention in set position when the flattening-out pressure on the clamp is released. The plates 60 are preferably mounted in flush relation with the top face of the frame 16, and the frame is suitably recessed behind said plates to permit the indicated insertion and movement of the pins 59 through the slots 61.

In mounting a prepared stencil sheet on the present copying stand, the stencil sheet is first disposed with the forward edge of the attached strip 54 engaging the rear, or upper, end of the backing plate 48, and a clamp 57 is mounted over the stencil at the strip 54, it being noted that

the slots 61 which are utilized define a line adjacent and parallel to the upper end line of the plate 48. While the slots 61 to be engaged by the pins of the upper clamp 57 may be directed in any desired direction in their plane for clamping securing purposes, said slots are preferably directed longitudinally of the backing plate 48 in mutually parallel relation and with their narrow portions nearest the forward plate end. With the latter arrangement, the movement of the clamp 57 to its fully mounted and operative position is arranged to stroke the stencil sheet forwardly to provide and insure a true registration of the forward edge of the strip 54 with the rearward edge of the backing plate 48.

When the stencil sheet 47 has been secured at its upper end, as by a clamp 57, a second clamp 57 is applied across the lower (forward) end of the stencil sheet. As shown, two pairs of slot plates 60 are provided toward the lower end of the drawing surface whereby to secure stencils of different length without having to cover an appreciable part of the longer stencil sheet; the exact number and spacing of the plate pairs is, of course, determined by the lengths of the stencils, or other sheets to be mounted. It is to be particularly noted that the slots 61 of these forward slot plates are also directed longitudinally of the plate 48 and with their narrow parts at their forward ends; in this manner, the forward movement of a clamp 57 which has been flattened against a sheet which is secured at its upper end and has the heads of its pins 59 disposed behind a forward pair of plates 60, will be frictionally operative against the stencil to stroke it into fully stretched condition in its place over the backing plate 48 as the clamp is moved to its set position for securing the sheet thereat.

It will be noted that the present arrangement for mounting a stencil sheet in predetermined position and stretched condition over the backing and screen plate 48 is equally applicable to any flexible sheet which is to be mounted in the apparatus for receiving a drawing or other matter by tracing or direct drafting. If the sheet to be drawn on its not provided with a strip corresponding to the strip 54 on a stencil sheet, it is merely necessary to bend an upper end portion of the former sheet back upon itself whereby the sheet edge may be brought into registration with the top edge of the backing plate 48 in the manner taught for a strip 54 on a stencil sheet.

From the foregoing description taken in connection with the accompanying drawings, the advantages of the construction and use of the device will be readily understood by those skilled in the art to which the invention appertains. While I have described the features and the principle of operation of a structure which I now consider to be a preferred embodiment of my invention, I desire to have it understood that the showing is primarily illustrative, and that such changes may be made, when desired, as fall within the scope of the following claims.

I claim:

1. In drawing apparatus, a drawing board having a groove extending therein from its working surface, a T-square element having an elongated blade for extension across the working face of the board and a head block for engagement in said groove, a locking member pivoted to said block and arranged to have an end thereof normally held in frictional engagement with a groove side for frictionally engaging the block against the opposite groove side, a spring means coactive

with the locking member to urge its operative disposal, and a cam means engaging the member and manually operative to inoperatively dispose said locking member.

- 5 2. A structure in accordance with claim 1 wherein the cam means is provided on a crank shaft journaled in the head block, and a crank arm extends from said shaft in the direction of the blade for its rocking to simultaneously release the T-square element and displace it in the direction of displacement of the free end of the crank arm.

- 10 3. In drawing apparatus, a drawing board having a guide groove extending therein, a T-square element or the like having an elongated blade for extension across the working face of the board and a head block for sliding engagement in said groove; a friction shoe member mounted on said block for movement laterally therefrom to engage a groove side, a spring means normally reactive

between the member and block to engage the member and block with the opposite groove sides for frictionally securing the block in set adjusted position in the groove, and a cam means directly reactive between the member and block for manual actuation to render the member inoperative and thereby free the block for its movement along the groove.

4. A structure in accordance with claim 3 wherein the cam means comprises a cam mounted on a crank shaft journaled in the head block, and a crank arm extends from the shaft for its rocking to actuate the cam to release the element.

5. A structure in accordance with claim 3 wherein the cam means is controlled by an arm extending transversely of the line of the board groove for its rocking to simultaneously release the element and displace it in the direction of displacement of the free end of the arm.

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