

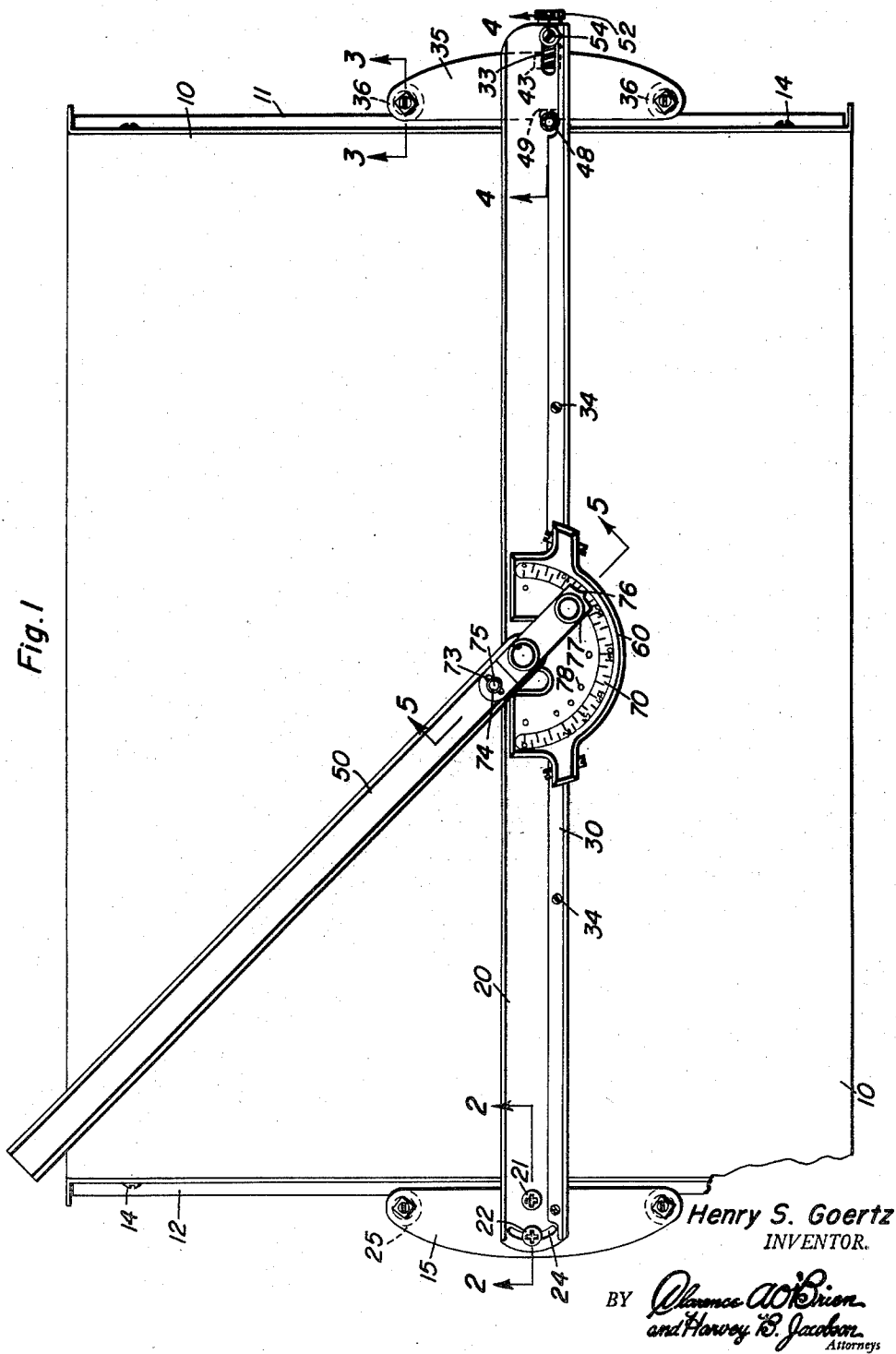
Oct. 4, 1960

H. S. GOERTZ
DRAFTING INSTRUMENT

2,954,609

Filed Dec. 27, 1954

3 Sheets-Sheet 1



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3 Sheets-Sheet 2

Fig. 4

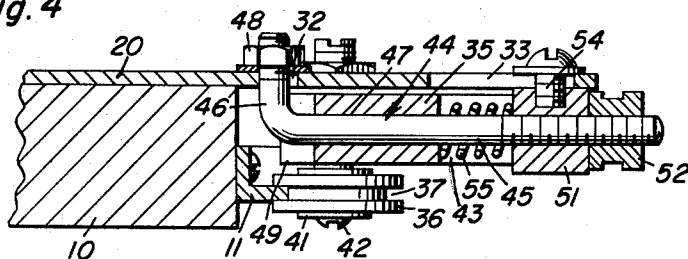


Fig. 2

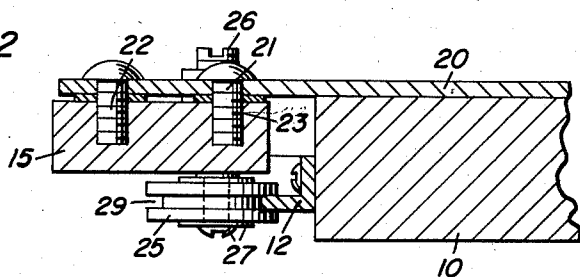


Fig. 3

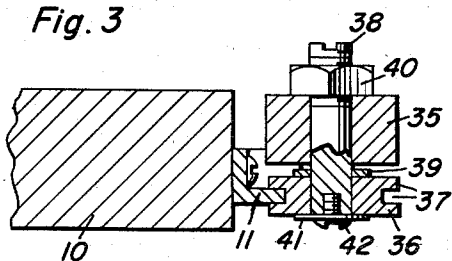
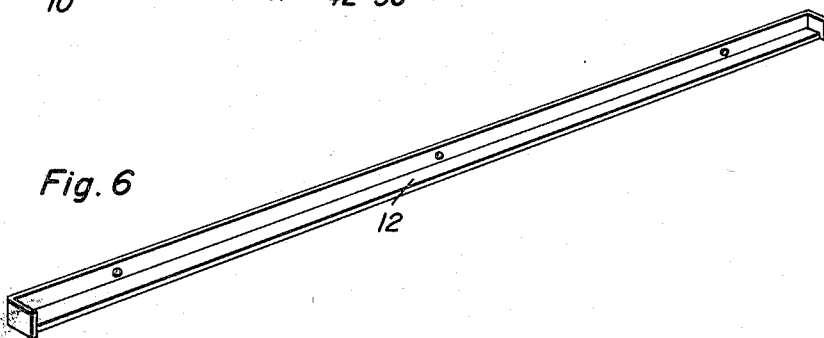


Fig. 6



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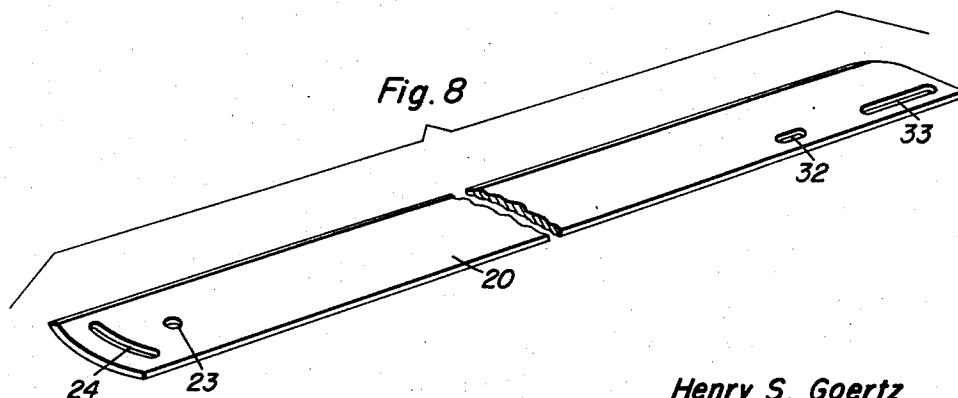
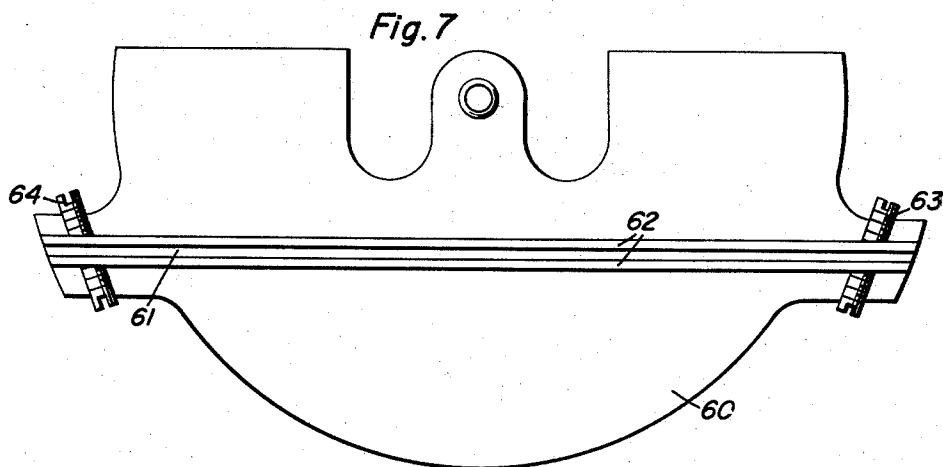
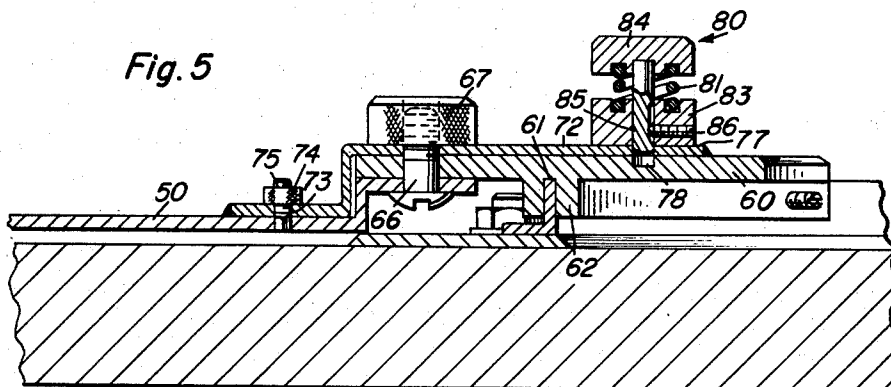
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DRAFTING INSTRUMENT

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3 Claims. (Cl. 33—80)

This invention relates to drafting instruments and it has for its object to provide a T-square equipped with such additional means that it is possible to dispense to a large extent or completely with all additional drafting instruments, such as triangles, protractors, etc.

A further object of the invention consists in providing means for guiding the T-square and the equipment associated with it along the drawing board resiliently in such a manner that the drawing board may be used at any inclination with respect to the horizontal and at the same time may be supported in any way, for instance, by the operator.

A further object of the invention consists in providing means for guiding the T-square and the equipment associated with it in such a manner that these means are self-adjusting and self-aligning, keeping the T-square blade in its correct position even if accidentally moved out of this position during movement of the said blade and also taking up the wear of the parts.

A further object of the invention consists in providing a T-square of the type above described which permits the drawing of lines along more preset or prepared angles than those which can be drawn when using triangles or similar aids in connection with the T-square.

A further object of the invention consists in providing a T-square with accessory equipment of the type above described which permits the obtaining of exact accuracy within less time than any conventional type T-square equipment.

A further object of the invention consists in a T-square the main blade of which is adjustable relatively to the head thus permitting preliminary adjustment of the blade of the T-square with the highest accuracy.

A further object of the invention consists in providing a T-square with a main blade and angle blade, the latter being adjustable to any angular position with respect to the main blade, and said adjustment being made by means of a protractor, which angle blade forms a unit with a protractor permitting to ascertain its angular position, which unit is displaceable along the main blade of the T-square and may be fixed at any desired point along said main blade.

A further object of the invention consists in providing a T-square of the type above mentioned in which the unit is provided with means for setting the angle blade accurately at a certain number of predetermined angles relatively to the main blade.

According to the invention the T-square is provided with heads having rollers running in tracks arranged along the sides of the drawing board, one of the heads being a tension head provided with tensioning means inserted between the main blade of the T-square and the said tension head and permitting to adjust the tension with which said rollers are drawn towards the tracks, said tension device making the blade self-aligning and bringing it always back into its correct position when, during movement of the blade it has been displaced accidentally.

A further feature of the invention also consists in the

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fact that the main blade of the T-square is rockable and finely adjustable relatively to the head, thus permitting an adjustment of the blade with the highest possible accuracy.

Further, according to the invention, an angle blade is mounted on the main blade of the T-square which co-operates with the main blade but which is supported by a special supporting plate carrying a protractor, said supporting plate and all the members mounted thereon being displaceable as a unit along the main blade of the T-square but may be fixed in any desired position on the same. This supporting plate is also provided with means for bringing the angle blade into certain predetermined angular positions corresponding to frequently used angles without using the protractor.

Further features of the invention and further more specific objects will be apparent from the following detailed specification.

The invention is illustrated in the accompanying drawings showing one embodiment thereof by way of example. It is however to be understood that the example illustrated in the drawings has been selected in order to explain the principle of the invention and the best mode of applying said principle. The embodiment illustrated is not to be considered as the sole way of applying the principle of the invention and, therefore, a departure from the specific example illustrated in the drawings is not necessarily a departure from the said principle.

In the drawings:

Figure 1 is a plan view of the drafting instrument.

Figure 2 is a fragmentary sectional elevational view through a portion of the device, the section being taken along line 2—2 of Figure 1.

Figure 3 is a fragmentary elevational sectional view through a portion of the device, the section being taken along line 3—3 of Figure 1.

Figure 4 is a fragmentary sectional elevational view through a portion of the device, the section being taken along line 4—4 of Figure 1.

Figure 5 is a fragmentary sectional elevational view along the median plane of the angle blade, the section being taken along line 5—5 of Figure 1.

Figure 6 is a perspective view of the angle track with which the sides of the drawing board are provided.

Figure 7 is a plan view of the underside of the supporting plate of the angle blade.

Figure 8 is a perspective view of the main blade of said T-square according to the invention.

In the example illustrated a drawing board 10 is provided with a track 11, 12, which preferably consists of an angle iron or L-shaped guide rail, running along each side of the board 10 and fastened to it by screws 14. The track rails 11, 12 serve as guides for the T-square head 15 and a tension head 35, respectively. The T-square head 15 (Figures 1 and 2) carries the blade or ruler 20 which is fixed on it by means of the screw bolts 21, 22, the latter passing through an arcuate slot 24 of the blade 20, thus permitting the adjustment of the angular position of the blade relatively to the head 15.

The head carries rollers 25 preferably made of Nylon (a trade name for a polyamide type of plastic fiber) and provided with a groove 29 into which the flange of the rail 12 enters. The rollers 25 rotate on a bolt 26 forming their axle. The position of the rollers 25 on the head 15 is preferably adjustable by mounting the rollers between a collar on the screw bolt 26 and a disk 27, the position of the bolt 26 being adjustable. The construction is the same as that shown in Figure 3 with respect to rollers 36 which is described below, the mounting of all rollers being identical.

It will be noted that the rails 11, 12 are so mounted on the drawing board 10 that the said rollers and their

holding and supporting parts do not project beyond the drawing board 10 so that the latter may be laid flat on a table without resting the board on any part or portion of the head 15.

The blade 20 may be made of stainless steel, or of plastic or wood or any other suitable material. It is chamfered at its upper or operative edge and it may be provided either with a fixed scale or with a sliding scale (not shown) for measuring purposes which is slidably movable in dovetailed grooves arranged in substantial parallelism with the operative edge. At the end connected with the head 15 of the T-square it is provided with a slot 24 and a bore or opening 23 which forms a passage for the screw 21 which serves to hold the blade on the head 15. The arcuate slot 24, as above mentioned, permits passage of the second screw 22 by means of which the blade is fastened and also permits adjustment of the head 15 relatively to the blade 20.

Along the bottom edge of the blade 20 an angle or an L-shaped rail 30 is fastened either by means of screws 34, or both the blade and the angle iron may be made of one piece. This angle or L-shaped rail may be made of brass or stainless steel. One of its flanges projects upwardly from the blade. The other flange which is screwed down on the blade is cut near the ends in order to uncover the slot 24 at one end and the two aligned slots 32 and 33 which are provided on the other end. This longitudinal rail or track serves a purpose which is described below.

On the end of the blade which carries the tension head 35 an elongated opening or slot 32 and a further slot 33 is provided both being aligned along a line which is parallel to the edges of the blade. These slots 32 and 33 are offset relatively to the middle line of the blade and are positioned near the lower edge of the blade 20. The slots serve a purpose which will be described.

One end of the blade 20 is fastened to the tension head 35 which is similar to head 15 except for two notches 43 and 49 which are provided for a purpose mentioned below. The head 35 carries the two rollers 36 which are rotatable around a screw bolt 38 which forms the axle of the rollers and which is provided with a collar 39 against which the rollers rest. On the other side the roller is held by a disk 41 secured to the bolt 38 by means of a screw 42 engaging a threaded hole in said bolt. The position of the rollers is thus adjustable by means of the self-locking nuts 40 engaging the threaded portion of bolt 38 which projects upwardly.

The readjustment of the position of the bolt and thereby of the position of the rollers is only necessary if drawing papers or drawing boards of materially different sizes are used in order to adjust the relative position of the blade 20 and of the rails 11 and 12, this position being dependent on the thickness of the paper or cardboard on the drawing board.

In order to adjust the tension with which the blade is held in such a manner that the blade 20 may be moved just with sufficient friction between the rollers and the tracks on which they run to keep the blade exactly in line at each point to which the blade may be moved, a special tensioning device is provided. This device consists of an L-shaped bolt 44 with a long leg 45 and a short leg 46 at right angles to each other. The ends of both legs are threaded. The short leg 46 passes through the short slot or elongated opening 32 of the blade 20 and its threaded end protrudes through the said slot or elongated opening and is engaged by a nut 48 and a washer. The long leg 45 which is at right angles to the short leg is thus held in a position which is parallel to the plane of the blade. This leg is aligned with the long slot 33 and it passes through a suitable bore 47 of the head 35 which permits however free movement of the head relatively to the said L-shaped bolt.

To keep the distance between the head and the drawing board at its minimum value, the head 35 is provided

with a notch 49 at the front, where the L-shaped bolt is located. The threaded end of the leg 45 of the L-shaped bolt 44 is surrounded by a block 51 the position of which is adjustable along the slot 33 with which the said leg is aligned. The block is held in the desired position by means of the screw bolt 54 which passes through the slot and which is screwed into the block while its head is supported by a washer resting on the slot 33 and on top of the blade 20. The position of the block 51 may thus be fixed. A milled or knurled knob 52 which is internally threaded engages the screw threads at the end of the long leg 45. Further a compression spring 55 is inserted between the block 51 and the head 35 which spring preferably rests on the bottom of the notch 43 provided within the head 35 on its outwardly turned side. The head 35 with its rollers 36 is always resiliently held under a preselected tension against the track and the drawing board on one side and presses against the blade 20 on the other side, a tension which is adjustable by adjusting the position of the block 51 and the knob 52.

In the event that excessive pressure is applied on either end of the blade 20, therefore the blade re-aligns itself longitudinally as soon as such excessive pressure ceases. By virtue of the tension device the T-square will therefore move freely under light push or pull movement at either end of the blade 20 always maintaining the correct position when the movement ceases. Eccentric pressure cannot cause misalignment except to the extent that there is some play between parts. During the movement of the blade the spring 55 will again cause alignment at the end of the movement. When the blade is used it is thus always in the desired position.

The blade 20 carries an angle blade 50 which is mounted on a special supporting plate 60 made of metal or plastic and which is displaceable along the blade 20, but is provided with means for fixing it in any selected position. This supporting plate 60, the under side of which is shown in Figure 7, has a track groove 61 into which the upstanding flange of the angle 30 mounted on blade 20 enters (see Figure 5). The track groove is formed between two downwardly projecting flanges 62, through which pairs of gripping and guiding screws 63, 64 facing each other are threaded, preferably in a somewhat inclined position. The screws 63, 64 are guiding means for the adjusting of the plate 60 along the blade and for its suitable aligning as well as means for producing friction and gripping to the amount required. The screws are preferably made of Nylon (trade-name of a plastic as above specified). By these means the supporting plate 60 may be fixed on the blade at any desired place.

The supporting plate 60 carries a protractor 70 which is fixedly mounted on it. It further carries the angle blade 50 which, as seen in Figure 5, is mounted by means of a threaded lock bolt or pivot pin 66 passing through the angle blade and a suitable bore in the supporting plate, and carrying a milled locking nut 67 engaging the threaded portion of the bolt 66 and locking it.

As the angle blade 50 is mounted on the underside of the supporting plate 60 the said angle blade is provided with an upper extension plate 72 which serves as an angle indicator and angle adjustment means and also as an adjustment means for setting the angle blade at certain fixed angles relatively to the main T-square blade 20.

The extension plate 72 projects rearwardly beyond the lock bolt 66 so that its end 77 is above or close to the protractor 70. The plate 72 is also provided with a circular opening fitting around the locking bolt 66. It is further provided with a slot 73 through which a rivet or screw bolt 75 with a threaded end portion passes. The screw bolt is held in the blade 50 and its threaded end is provided with a nut 74 engaging the threaded end portion of the screw bolt 75.

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The extension plate 72 is adjustable to a certain degree around the lock bolt or pivot pin 66 relative to the angle blade 50 and its position is fixed by means of the screw 75.

The end 77 of the extension plate 72 is provided with an indicating finger or a pointer like projection 76 which runs over the protractor scale 70. The pointer or finger permits to read the angle at which the angle blade 50 has been set with great precision. The adjustability of the finger or pointer carrying extension plate 72 on the angle blade permits to correct any inaccuracy in the original setting.

As certain angles are used more frequently and in preference to others, provision is made to bring the angle blade into a position corresponding to these angles without having first to adjust the position with great care. For this purpose the plate 60 is provided with a number of depressions, recesses or holes 78 which are provided at the desired angles, for instance, at angles of 60°, 45°, 30° etc. or any other angle much in use for a particular piece of work. The extension plate 72 carries moreover a register button 80 preferably consisting of several parts, one of them, 83, being welded or otherwise attached to the extension plate 72 and another part being a press button 84 and spaced from the part 83 by a compression spring 81. The press button 84 carries a registering pin 85 which is guided within a bore in part 83 and is provided with a small groove engaged by a setscrew 86. The operator normally therefore turns the angle blade around reading the angle on the protractor scale 70. If it is desired to use the angle blade 50 precisely at one of the angles which has been preselected and whose position is fixed, he turns the angle blade to this point and presses the button whereupon the pin 85 enters the depression 78 and this marks exactly the position at which the angle blade 50 is at the desired angle relatively to the main blade 20. The operator may hold the button down while he draws the line or after finding the preselected position he may make the angle blade stationary, using knob 67 and this will enable him to release button 80 so as to have both hands free. When released the button returns under the influence of the spring and holds the angle blade in the same way as he does when drawing lines for other angles.

Before the instrument is used the exact position of the extension plate 72 and thereby the correct reading of the position of the angle blade 50 relatively to the main blade is adjusted by means of the screw bolt 75 and the nut 74.

It will be noted that the angle blade 50 is somewhat smaller than the main blade 20 and that its pivot point which is the axis of the lock bolt 66 is located near the upper edge of the main blade 20. Therefore, the angle blade 50 may be turned completely around through 180° into a position in which it is aligned with and parallel to the main blade 20. The tension device at the end of the main blade 20 will not in any way interfere with this complete alignment of the angle blade with the main blade on account of the eccentric position of the slots 32 and 33 and of the screw bolts and heads passing through said slots.

From the above it will be seen that the drafting instrument according to the invention possesses a number of important advantages with respect to construction and operation which advantages greatly add to its utility.

The main advantages of the equipment consists in the elimination of the handling and changing of triangles and of similar accessories. This eliminates the necessity to hold a plurality of instruments with one hand and drawing lines with the other hand. Further, this also eliminates the necessity of providing a flat top space holding said triangles and other accessory instruments in place during use and when not in use. Further the necessity is eliminated to hold the T-square and the drawing board in place when drawing lines and the draw-

ing board may be operated in any position and at any inclination with respect to the horizontal; for instance, it may be held on the operator's knees.

Further, a main advantage of the invention consists in the fact that all members which the draftsman must use form a unit and may be used as a unit and that this unit is held automatically aligned in its correct position.

It will be understood that the example illustrated shows a number of details which are unessential and which may be changed in any way without departing from the essence of the invention as defined in the annexed claims.

What is claimed as new is as follows:

1. A drafting instrument comprising a drawing board having parallel sides, a track on each of two parallel sides thereof, a T-square including a T-square blade, a T-square head at one end of the said blade and a tensioning head at the other end of said blade, the latter pulling said T-square blade longitudinally, applying both heads against said drawing board, each of said heads being provided with rollers applied against said tracks of the drawing board on the respective sides thereof, and an L-shaped bolt having a shorter section at right angles to the said T-square blade and a longer section extending in a direction substantially parallel to the said blade, the shorter section of the said L-shaped bolt, at right angles to the T-square blade, projecting through an opening of said T-square blade and being held on the latter on the upper side thereof, a block member adjustably held on the longer section of the L-shaped bolt, parallel to the T-square blade, said longer section passing through a bore of the tensioning head, resilient means applied against the block member and the tensioning head, urging the latter and the rollers carried by it against the track on one side of the drafting board and simultaneously urging the T-square head on the other side of the drafting board as well as the rollers carried by the said T-square head against the track on the other side of the drafting board, and means for adjusting the distance between the block member and the tensioning head, said last-named means also adjusting the tension produced by the said resilient means.

2. A drafting instrument as claimed in claim 1 wherein one end of said T-square blade projects beyond the tension head and is provided with two elongated slots, one of greater length than the other, both slots being aligned and located on the T-square blade on one side near the edge thereof, the smaller slot being further located near the inner side of the tension head adjacent to the drafting board, the longer slot being located near the outer end of the T-square blade, the smaller slot forming the opening in the T-square blade through which the shorter section of the L-shaped bolt projects, the longer section of the L-shaped bolt being aligned with the longer elongated slot, the block member adjustably held on the longer section of the L-shaped bolt, being displaceable along the latter and along the elongated longer slot, said block member being provided with means for fixing it in a selected position along the said elongated longer slot and for preventing a transverse movement of the block member and of the longer section of the L-shaped bolt with respect to said slot, the resilient means inserted between said block member and said tension head being adjusted by the adjustment of the position of the block member in a direction which is parallel to the said longer elongated slot.

3. A drafting instrument as claimed in claim 1, wherein the T-square blade is provided with a longitudinal track, an angle blade carrying member on said track, means for fixing said angle blade carrying member in a preselected position on said longitudinal T-square blade track, an angle blade mounted on the underside of said angle blade carrying member, an extension plate carried on the upper side of the said angle blade carrying member, said extension plate carrying an angle indicating

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member, protractor graduations on the angle blade carrying member, said angle blade carrying member provided with depressions at preselected angular positions, a register button on said extension plate adapted to enter the depressions when the angle blade is in predetermined angular positions relative to the T-square blade corresponding to the preselected angular positions of the depressions, a lock bolt forming a pivot around which the angle blade may turn, locking means on said lock bolt to lock the angle blade in an angular position which has been selected, and an adjusting means including a lock bolt cooperating with an elongated opening in the extension plate for adjusting the relative position of the angle blade and of the extension plate.

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