June 5, 1945. L. KETTING 2,377,429

DRAFTING MACHINE

Filed May 13, 1942 3 Sheets-Sheet 1

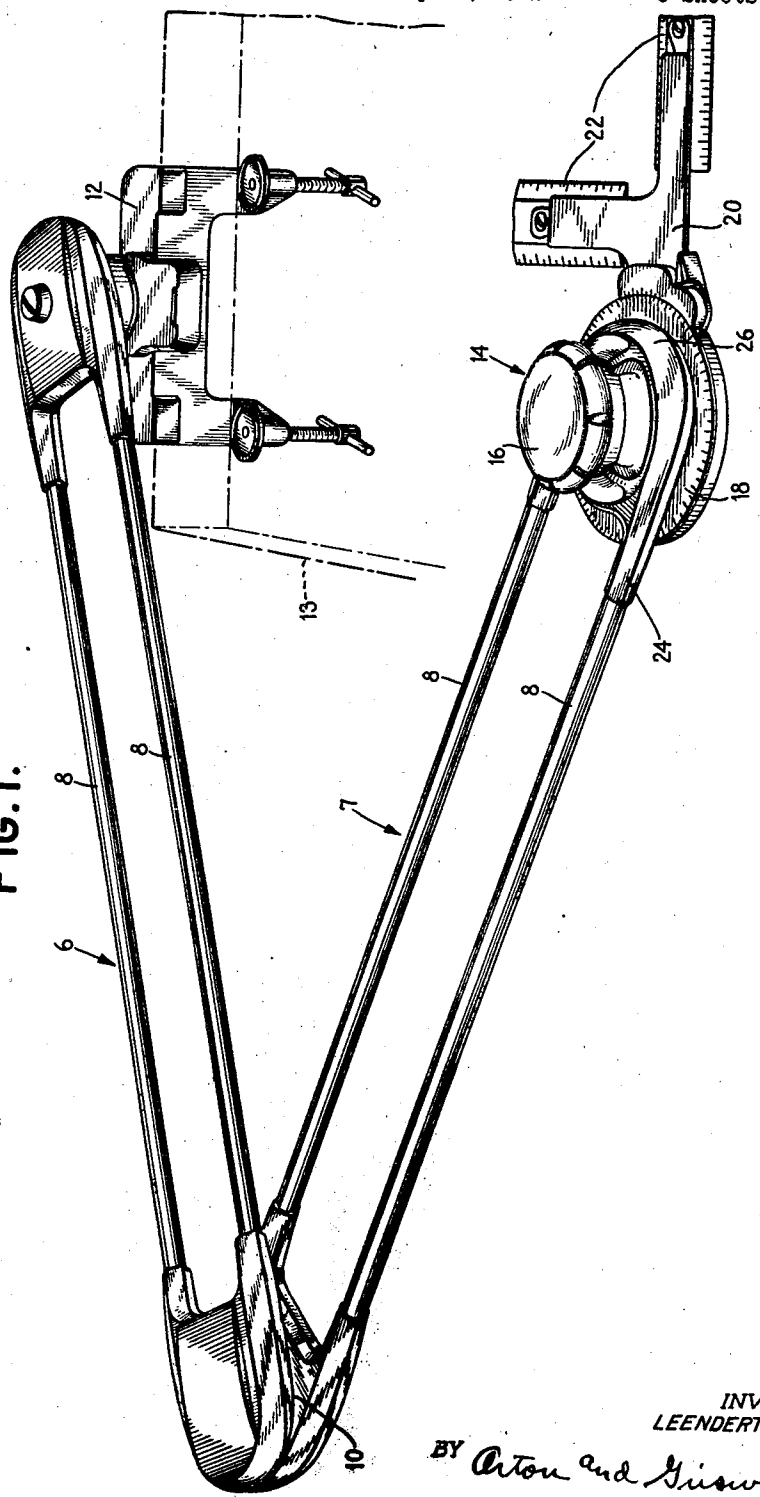


FIG. 1.

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DRAFTING MACHINE

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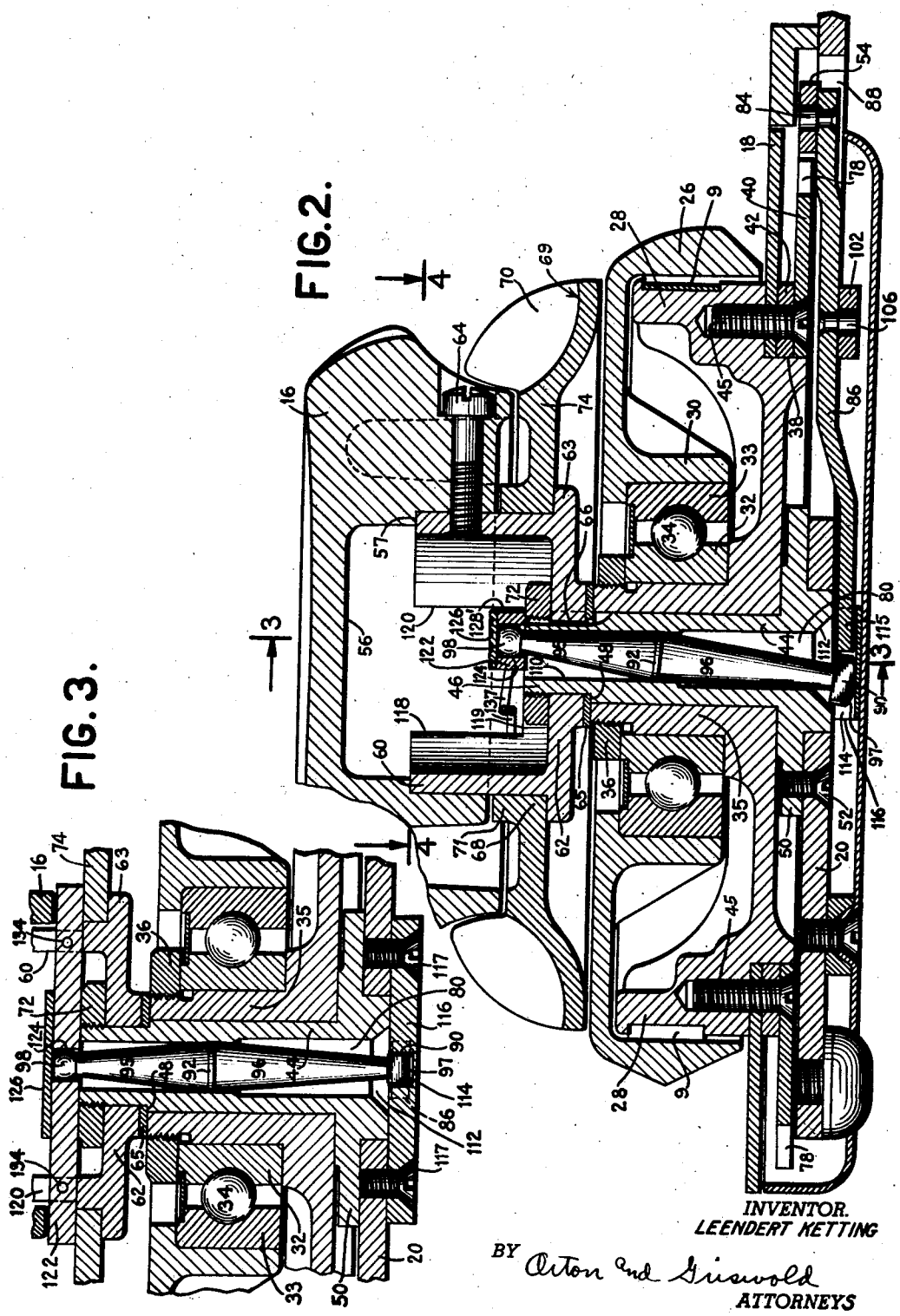


FIG. 2.

FIG. 3.

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DRAFTING MACHINE

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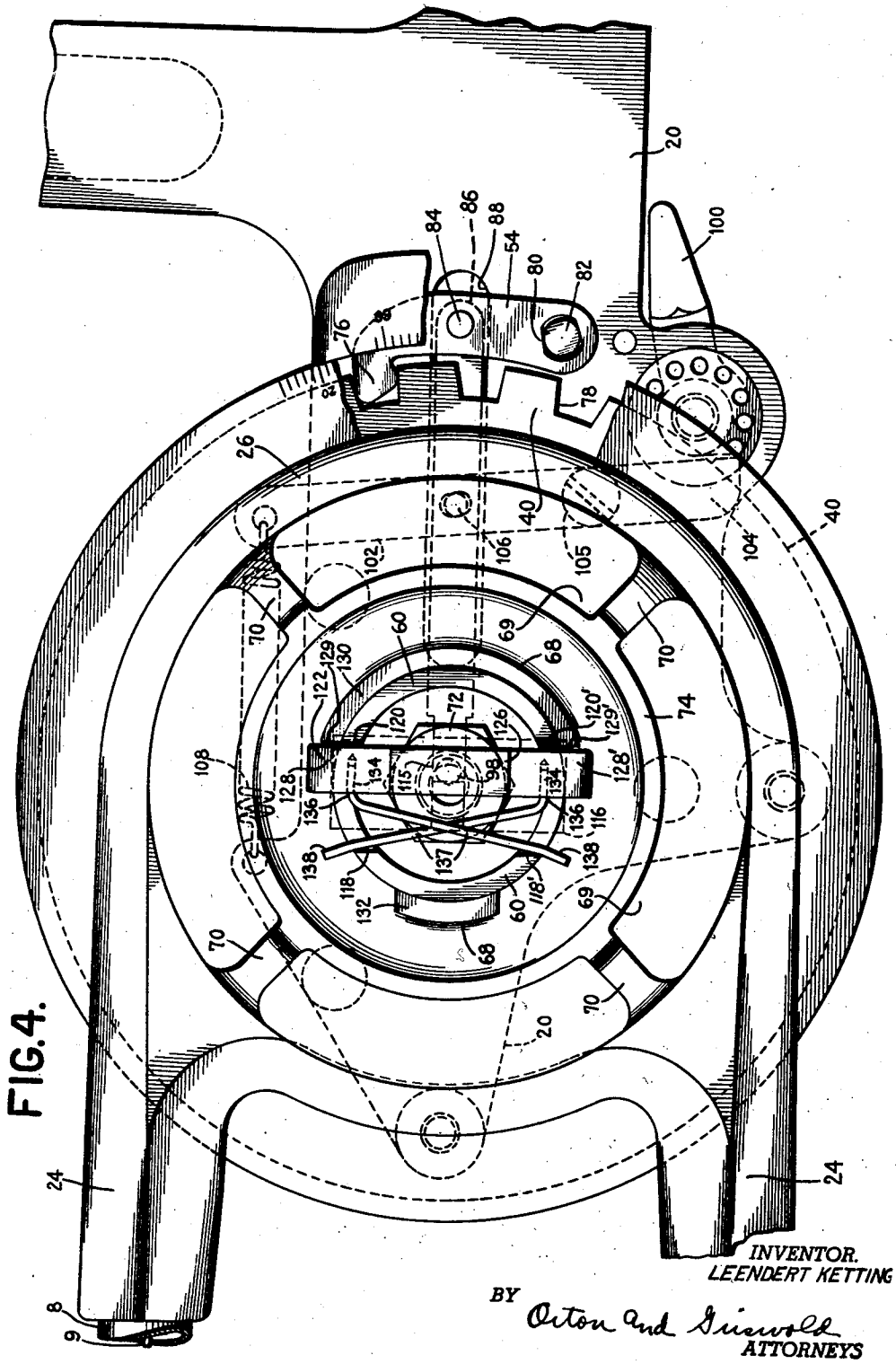


FIG.4.

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Patented June 5, 1945 2,377,429

UNITED STATES PATENT OFFICE

2,377,429

DRAFTING MACHINE

Leendert Ketting, Secaucus, N. J., assignor to Keuffel & Esser Company, Hoboken, N. J., a corporation of New Jersey

Application May 13, 1942, Serial No. 442,823

23 Claims. (Cl. 33—79)

This invention relates generally to parallel motion drafting devices of the kind in which the several tools which the draftsman handles most frequently are embodied, in principle, in one unit to obviate the necessity of a draftsman reaching about for a required tool and thereby enabling the draftsman to keep his attention concentrated directly upon the drawing.

Drafting devices of this character are common in which adjacent ends of two arms are pivoted together, the free end of one arm being anchored to the remote side of a drafting board while the free end of the other arm is provided with a head comprising a protractor and straight-edges which are in fixed angular relation and move about the center of the protractor as an axis. Such straight-edges have heretofore been so associated with the protractor as to be set and locked at any angle of the protractor or to be automatically locked at predetermined intervals. However, the instrumentalities effecting the setting of the straight-edges with respect to readings on the protractor have been characterized by difficulty in the manual actuation of the locking device because of its inaccessibility.

One object of the present invention is a drafting device of the character described, wherein actuating means of the locking devices for the straight-edges are readily accessible for manipulation without moving the hand from the actuating knob on the protractor head.

The invention also has for one of its objects locking and releasing mechanism for the protractor which may conveniently be actuated by either the thumb or a finger, as found most convenient, of the hand manipulating the knob by which the scale frame is moved to the desired relative position. In carrying this aspect of the invention into effect, a rotatable wheel is preferably provided on the knob, which is movable in either direction to unlatch the straight-edges and permit them to be moved freely to any angular position but which, on release, will effect locking of the protractor at the nearest even predetermined position.

Another object of the invention is to return the rotatable wheel on the knob to initial position whenever it is released by the operator. Accordingly, power is stored in power storing devices when the wheel is moved from initial position and which is utilized to return the wheel.

The invention further seeks an instrumentality transferring the rotary movement of the thumb or finger actuated devices to the latching devices for the protractor with a minimum number of parts to simplify assembly and to avoid the necessity for interlocking lever arms and other movement transferring devices.

The invention also resides in the details of construction by which the drafting device is made practical from the standpoint of ease, simplicity and convenience in manufacture and assembly as well as durability and facility in use.

These and other objects of the invention and the means for their attainment will be more apparent from the following detailed description, taken in connection with the accompanying drawings illustrating one embodiment by which the invention may be realized, and in which:

Figure 1 is a diagrammatic view showing the drafting machine mounted on a drawing table;

Figure 2 is a view showing the head of the drafting device of this invention in vertical section;

Figure 3 is a fragmentary view of the drafting head in vertical section taken in the plane perpendicular to the plane of the section illustrated in Figure 2 and on the line 3—3 of Figure 2, looking in the direction of the arrows; and

Figure 4 is a transverse view taken in the plane indicated by the line 4—4 of Figure 2, looking in the direction of the arrows.

Referring first to Figure 1, there is illustrated a typical "endless band and pulley" type of drafting machine which comprises a pair of arms 6, 7 each comprised of tubes 8 within which an endless band 9 in each arm travels. The adjacent ends of the arms are pivoted together, as at 10. The free end of one arm is anchored, as at 12, to the side of a drafting board 13 while the free end of the other arm is provided with a supporting head 14 comprising the knob or handle 16, a protractor 18 and frame means 20 supporting the straight-edges 22. Obviously the arms may assume any convenient structural shape.

As shown the tubes 8 extend into a frame member 24 comprising an outer flange 26 within which the pulley 28 turns. Inwardly of flange 26 is a cylindrical flange 30 concentric with the axis of the head. Rotatably mounted within the cylindrical flange 30, as by the ball races 32, 33 and ball bearings 34, is a cylindrical hub portion 35 which is integral with the pulley 28 and retains the bearing member 32 by means of a retaining ring 36 threaded to the upper end of the hub 35. Thus the pulley 28 is free to rotate within the frame portion 24 of the head without friction.

The pulley member 28 is rabbeted as at 38 to receive the protractor plate 18 and a locking

plate 40 spaced from the protractor plate by a spacing ring 42. The locking plate 40 and the protractor 18 are fixed to the pulley by means of the screws or other securing means 45. Within the cylindrical hub 35 of the pulley is disposed a sleeve 44 functioning as a pivot pin and having its upper end of reduced diameter, as indicated at 46, so that a shoulder 48 is provided substantially flush with the upper surface of the pulley hub 35. The sleeve 44 is secured to, as by being made integral with, a plate-like bottom portion 50 to which the straight-edge supporting frame 20 is secured as by the screws 52.

The knob 16 is secured to the pivot pin 44 so that rotation of the knob 16 will rotate the straight-edge supporting frame 20 whenever that frame is released from the pulley by disengaging a common type of latch member 54 from the toothed latching plate 40, as will be understood. The knob 16 is operatively connected with the pivot pin in the following manner:

The knob 16 is recessed, as at 56, and receives a generally cylindrical or cup-shaped knob-supporting frame member 60—62 comprised of the cylindrical or annular wall 60 and a bottom wall 62 which extends beyond the circumferential margin of the wall 60 as a flange 63 to support a manually actuatable device 74 controlling the pawl 54 as hereinafter described. The knob 16 is secured to the wall 60 as by a screw 64 while the bottom wall 62 is keyed, as at 66, to the pivot pin 44 whereby rotary movement of the knob and frame member will turn the sleeve-like pivot pin 44 and with it the straight-edge supporting frame 20. The bottom surface of the bottom wall 62 rests on a spacing ring 65 supported on shoulder 48 of pivot pin 44. The cup-shaped member 60—62 and pivot pin 44 are thus rotatable with respect to pulley 28.

The manually actuatable devices controlling the latch are carried by the knob 16 above the level of the arm and in a position to be operated by the same hand of an operator as is used to grasp the knob. As shown, the manually actuatable device takes the form of an annulus indicated generally at 74 and comprised of a hub portion 68 supported on the flange 63 and a finger engageable depressed portion 69 having spaced radial ribs 70.

The upper end 46 of the tubular pivot pin 44 is held in position by a nut 72 threaded on the upper end of the pivot member and bearing against the bottom wall 62 of the cup-shaped member to retain it against the spacing ring 65 on shoulder 48. Thus the pulley 28 and knob frame 60—62 are held in assembly on the pivot member 44 by means of the disc-like portion 50 at its lower end and the nut-like member 72 at its upper end. The nut member 72 may, if desired, conveniently form a supporting surface for parts of the latch actuating means.

The cooperating latching member is shown in greater detail in Figure 4 as an angular shaped lever 54 formed with a detent 76 at its one end, which is so shaped as to enter into and position itself in one of the recesses 78 of the latch plate 40. The other extremity of the pawl 54 is formed with an aperture 80 for reception on a pin 82 mounted on the straight-edge supporting means 20. The lever 54 is urged toward the latching plate 40 by the engagement of a pin 84 therewith, which pin 84 is carried by the end of the slide 86. The slide is reciprocable in a slot or the equivalent 88 formed in the frame 20 and terminating proximate the end 90 of a universally mounted oscillating member or lever 90—98. In order to hold the straight-edge at points intermediate the registering position of the notches, a lock member 100 is provided which, since it is rarely used, is carried, in the illustrated embodiment, at a low point as on the frame 20. Any convenient clamping lever or locking means may be provided within the purview of this invention and no further discussion thereof is deemed necessary.

Beneath the slide 86 is a lever 102, 104 pivoted to the frame 20, as at 105, and connected to the slide 86 with provision for lost motion by a pin 106 in a slot in slide 86. The free end 104 of the lever 102, 104 is positioned proximate the manually actuatable device 100, which is used to hold the latching plate 40 at intermediate points. By this relation of parts, actuation of the device 100 will shift the lever and effect release of the pawl, as will be understanable. The other end 102 of lever 102, 104 is urged toward the axis of the pulley 28 by power storing means shown as the coil spring 108 connected at the one end to the lever 102—104 and at the other end to the frame 20.

The bore 110 of the pivot tube 44 is enlarged in its lower half, and at the lower end of the enlarged portion is flared, as at 112, to provide, there, a passage of greater area. Seated in the surface formed by the bore 110 is the circumferential bead 92 of the rocking member or lever 90—98 which tapers from an intermediate point defined by the bead 92 in both directions, as at 95, 96. The lower extremity 96 of the lever terminates in an elongated rectangular end or block 90, the lower surface of which is curvilinear, as at 97, and rests on the bottom of a rectilinear slot 114 formed in a supporting or positioning plate 116 which is conveniently secured to the frame 20 as by the screws 117. The block 90 is thus disposed substantially below the plane of the lower end of the pivot pin 44 and is adapted to engage the constricted end 115 of the reciprocating slide 86 which extends into the slot 114 in plate 116. When the lever 90—98 is pivoted on the bead 92 in a counterclockwise direction, as viewed in Figure 2, the head 90 engages the end of the link 86 forcing it to the right as viewed in that figure to disengage the latching device 54 from the latching plate 40. The lever 90—98 is thus confined to rock in the vertical plane of the slot 114, and does not rotate axially.

The upper extremity of the swivelling lever 90—98 terminates in a spherical member or ball 98 disposed above the plane of the upper surface of the nut-like member 72.

The lever 90—98 is actuated and controlled to manipulate the latch 54 from its upper end. The wall 60 of the cup-shaped knob carrying frame 60—63 is formed with oppositely disposed cut-out portions on opposite sides defined by vertical parallel walls 118, 120 and 118', 120', which extend downwardly sufficiently so that the bottom 119 of the cut-out portion conveniently lies above the plane of the upper surface of the nut-like member 72. Each cut-away portion 118, 120 and 118', 120' of the wall 60 subtends such an angle as to permit sufficient movement of the actuating devices to actuate the latching devices 54.

Slidable on the bottom surface 119 of the cut-out portions of the knob frame 60 are the end portions of a transversely extending bar or slide 122 formed intermediate its ends with a recess,

shown as an aperture 124 closed by a top plate 126, and which receives the spherical end 98 of the double cone rocker-arm 90—98. The transverse bar 122 is of a length sufficiently greater than the outside diameter of the cup-shaped portion 60 that the ends 128, 128' thereof may, in all positions of the bar, extend through the cut-away portions of the supporting frame 60 for engagement and actuation by manually actuatable means 70—74, which is illustrated as carried below the handle 16.

As illustrated, the upwardly projecting cylindrical portion 71 of the annular hub 68 of the manually actuated control member 70—74 is cut-away on opposite sides, as at 129, 129' to the plane of the bottoms 119 of the cut-out portions 118, 120 and 118', 120' of the frame member 60—62 so that an arcuate hub portion 130 subtends substantially the same angle as the adjacent arcuate portion of the wall 60 of the cup-shaped frame member 60—62, while the hub portion 132 diametrically opposite the aforesaid portion 130 subtends preferably a materially smaller angle. Then, when the annular actuating member 74 is rotated in either direction by actuation of member 68—74, one end 129 or the other end 129' of the arcuate portion 130 will engage a protruding end 128 or 128' of the bar 122 and move it in the same direction while the opposite end of the bar 128' or 128, as the case may be, is fulcrumed on the wall 120' or 120. This displaces the apertured intermediate portion of the bar 122 toward the rear hub portion 132 carrying with it the upper end 98 of the member 90—98 and thereby causing it to rock on its fulcrum 92 and in so rocking engage its lower end 90 against the link 86 and actuate the latch. A resilient device is provided to normally urge the end 96 of the swivelling lever toward the left, as viewed in Figure 2. As shown, the bar 122 is provided with receptacles 134, which may be holes drilled in the bar in a horizontal plane. Into each one of these holes is inserted the anchoring end 136 of a spring 136—138 shown in this instance of round resilient wire. The ends 136 are so bent that the intermediate portions 137 cross one another, say, on the axis of the device and engage at their free ends 138 the edges 118—118' of the rearmost arcuate wall portion 60. Conveniently, the extremities 138 of the springs are angularly bent, as at 138, away from the bar 122 so as to provide an angular portion which will position itself on a wall portion 118, 118' against displacement. Thus, when the manually actuatable device 74 is rotated, one end of the bar 122 is moved "rearwardly" carrying with it the upper end 98 of the swivel against the action of the springs, the spring not under compression functioning to urge the other end of the bar against the arcuate wall portion 120 which is relatively stationary and serves as a fulcrum so that the bar may readily rock when the actuatable device 74 is manipulated.

The operation of the device will be apparent from the foregoing description. Suffice it to say that a draftsman may release the straight-edges by a slight rotation of the star-wheel 74 with reference to the knob 16 by the thumb or finger of the same hand which engages the knob and without removing the hand from the knob. Rotation of annulus 74 in either direction carries with it the cam 130 which in turn brings the advancing end of the arcuate element 130 (depending on the direction of rotation) against one of the ends of the bar 122 and forces the arm end to the left, as viewed in Figure 4. This brings an end of the composite bar 122 toward the left against the action of the spring 136—138, as viewed, and rocks the swivel in a counter-clockwise direction to advance the slide 86 and cause release of the pawl 54. The knob 16 and star wheel 74 are then turned simultaneously to adjust the straight-edges to the new angular position when the star wheel 74 is released permitting the parts of the locking instrumentalities to return to original position under the influence of the springs 108 and 136—138 and latching the frame 20 in the selected position. In the return of the parts, the walls 120 and 120' serve as stops for bar 122 in its movement to initial position.

Various modifications will occur to those skilled in the art in the composition, configuration and disposition of the component elements going to make up the invention as a whole as well as in the selection and combination of features to accomplish the results sought, and no limitation is intended by the phraseology of the foregoing description or illustrations in the accompanying drawings, except as indicated in the appended claims.

What is claimed is:

1. In a drafting machine, means fixed in orientation, a straight-edge supporting frame, means for latching said frame to said means fixed in orientation, reciprocating means below said straight-edge supporting frame for actuating said latching means, a tubular pivot pin mounting said frame for rotary movement below said means fixed in orientation, a lever fulcrumed in the bore of said pivot pin, a cup-shaped frame member carried by the upper end of the pivot pin, a handle fixed to said frame member, the wall of said cup-shaped member being oppositely slotted, a bar whereof the ends protrude through the slots in the wall of the cup-shaped member, means operatively connecting the bar and an end of the lever, manually actuatable means rotatably mounted upon the cup-shaped member, an arcuate cam carried by said manually actuatable means and adapted to selectively engage at least one end of the bar upon oscillation of said manually actuatable means to oscillate the bar and actuate the lever and spring means carried by the bar and engaging the cup-shaped member to oppose movement of the bar when the manually actuated means is actuated.

2. In a drafting machine, means fixed in orientation, a straight-edge supporting frame, means for latching said frame to said means fixed in orientation, reciprocating means below said straight-edge supporting frame for actuating said latching means, a tubular pivot pin mounting said frame for rotary movement below said means fixed in orientation, a lever fulcrumed in the bore of said pivot pin, a cup-shaped frame member carried by the upper end of the pivot pin, a handle affixed to said frame member, the wall of said cup-shaped member being oppositely slotted, a bar whereof the ends protrude through the slots in the wall of the cup-shaped member, means operatively connecting the bar and the upper end of the lever, manually actuatable means comprising a hub rotatably mounted upon the cup-shaped frame for reciprocation and whereof the hub is interrupted to provide an arcuate cam, the ends of which are selectively engageable with the respective ends of the bar upon oscillation of said manually actuatable means to oscillate the bar and thereby the lever,

and spring arms carried by the respective ends of the bar and crossing one another to extend within the slots and engaging the cup-shaped member and engage a wall thereof to yieldingly oppose angular movement of the bar when the oscillating member and manually actuated means are rotated.

3. In a drafting machine, means fixed in orientation, a straight-edge supporting frame, means for latching said frame to said means fixed in orientation, reciprocating means below said straight-edge supporting frame for actuating said latching means, a tubular pivot pin whereof the lower portion of the bore is of an increased diameter extending through said means fixed in orientation and mounting said frame for rotary movement below said means fixed in orientation, a handle fixed to said pivot pin above said first named means, a lever fulcrumed in the bore of smaller diameter and progressively decreasing in diameter towards its ends, a cup-shaped frame member carried by the upper end of the pivot pin, a handle affixed to the cup-shaped frame member, the wall of said cup-shaped member being oppositely slotted, a bar whereof the ends protrude through the slots in the wall of the cup-shaped member, means operatively connecting the bar and the upper end of the lever, manually actuatable means rotatably mounted upon the cup-shaped member, an arcuate cam carried by the manually actuatable means and whereof the ends are selectively engageable with the respective ends of the bar upon oscillation of said manually actuatable means to oscillate the bar and thereby the lever, and spring means carried by the respective ends of the bar and engaging the cup-shaped member to yieldingly oppose angular movement of the bar when the manually actuated means is oscillated in either direction.

4. In a drafting machine, means fixed in orientation, a straight-edge supporting frame, means for latching said frame to said means fixed in orientation, reciprocating means below said straight-edge supporting frame for actuating said latching means, a tubular pivot pin mounting said frame for rotary movement below said means fixed in orientation, a lever fulcrumed in the bore of the pivot pin, a cup-shaped frame member carried by the upper end of the pivot pin to which the handle is affixed, the wall of said cup-shaped member being slotted, a bar whereof the ends protrude through the slots in the wall of the cup-shaped member, operative connections between the bar and the lever, said cup-shaped member being formed with flange means, manually actuatable means rotatably mounted upon said flange means for reciprocation and having an arcuate cam, the ends of which are selectively engageable with the respective ends of the bar upon oscillation of said manually engageable member to oscillate the bar and thereby the lever and spring means to yieldingly oppose movement of the bar when the oscillating member is rotated in either direction.

5. In a drafting machine, means fixed in orientation, a straight-edge supporting frame, means for latching said frame to said means fixed in orientation, reciprocating means below said straight-edge supporting frame for actuating said latching means, a pivot pin mounting said frame for rotary movement below said means fixed in orientation, a lever fulcrumed in the pivot pin, a frame member carried by the upper end of the pivot pin to which the handle is affixed, said member being oppositely slotted, a bar whereof the ends protrude through the slots in the member, operative connections between the bar and the lever, manually actuatable means rotatably mounted upon the frame member for reciprocation, arcuate cam means carried by the manually actuatable means whereof the ends are selectively engageable with the respective ends of the bar upon oscillation of said manually engageable means to oscillate the bar and spring arms carried by the respective ends of the bar and crossing one another to engage the sides of the slots in the cup-shaped member and yieldingly oppose angular movement of the bar when the oscillating member is rotated in either direction.

6. In a drafting machine, means fixed in orientation, a straight-edge supporting frame, means for latching said frame to said means fixed in orientation, reciprocating means below said straight-edge supporting frame for actuating said latching means, a pivot pin whereof the lower portion of the bore is of an increased diameter and extending through said means fixed in orientation and mounting said frame for rotary movement below said means fixed in orientation, a lever fulcrumed in the bore of smaller diameter and progressively decreasing in diameter towards its ends, a frame member carried by the upper end of the pivot pin to which the handle is affixed, a bar, means operatively connecting the bar and the upper end of the lever, manually actuatable means rotatably mounted upon the frame member, a cam carried by the manually actuatable means and engageable with the bar upon oscillation of said manually engageable member to pivot the bar and spring means to yieldingly oppose movement of the bar when the actuatable means is actuated.

7. In a drafting machine, means fixed in orientation, a straight-edge supporting frame, means for latching said frame to said means fixed in orientation, reciprocating means below said straight-edge supporting frame for actuating said latching means, a pivot pin whereof the lower portion of the bore is of an increased diameter and extending through said means fixed in orientation and mounting said frame for rotary movement below said means fixed in orientation, a lever formed intermediate its ends with a circumferential bead fulcrumed in the bore of the pivot pin, a frame member carried by the upper end of the pivot pin, a handle affixed to the frame member, a bar operatively connected with the lever, manually actuatable means rotatably mounted upon the frame member for reciprocation, a cam carried by said manually actuatable means to pivot the bar and spring means to yieldingly oppose movement of the bar when the manually actuatable means is actuated.

8. In a drafting machine, means fixed in orientation, a straight-edge supporting frame, means for latching said frame to said means fixed in orientation, reciprocating means below said straight-edge supporting frame for actuating said latching means, a pivot pin whereof the lower portion of the bore is of an increased diameter extending through said means fixed in orientation and mounting said frame for rotary movement below said means fixed in orientation, a lever fulcrumed in the bore of smaller diameter and progressively decreasing in diameter towards its ends, the upper end of the lever being formed with a ball, a frame member carried by the upper end of the pivot pin, a handle affixed to the frame member, a bar formed with a recess

receiving the ball on the lever, manually actuatable means rotatably mounted upon the frame member, a cam carried by said manually actuatable means to pivot the bar and spring means to yieldingly oppose pivotal movement of the bar about the ball when the actuatable means is actuated.

9. In a drafting machine, means fixed in orientation, a straight-edge supporting frame, means for latching said frame to said means fixed in orientation, reciprocating means below said straight-edge supporting frame for actuating said latching means, a tubular pivot means extending through said means fixed in orientation and mounting said frame for rotary movement below said means fixed in orientation, a lever in the bore of said pivot means, means to support the lever in position in the pivot means, said lever supporting means being supported independently of the pivot means and positioning the latch actuating means, a frame member carried by the upper end of the pivot pin, a handle affixed to the frame member, manually actuatable means rotatably mounted with respect to the frame member and operative connections between the manually actuatable means and the lever for actuation thereof.

10. In a drafting machine, means fixed in orientation, a straight-edge supporting frame, means for latching said frame to said means fixed in orientation, reciprocating means below said straight-edge supporting frame for actuating said latching means, a tubular pivot pin extending through said means fixed in orientation and mounting said frame for rotary movement below said means fixed in orientation, the lower portion of the bore of said pivot pin being of an increased diameter and being flared at its lower end, a handle fixed to said pivot pin above said first named means, a lever formed at the lower end with a head elongated in the direction of the latch actuating means, a plate supported beneath the pivot pin and independently thereof to retain the lever in the pivot pin and in position to actuate the latch actuating means, a frame member carried by the upper end of the pivot pin, a handle affixed to the frame member, manually actuatable means rotatably mounted upon the frame and operative connections between the manually actuatable means and the lever for actuation thereof.

11. In a drafting machine, means fixed in orientation, a straight-edge supporting frame, means for latching said frame to said means fixed in orientation, reciprocating means for actuating said latching means, a tubular pivot pin mounting said frame for rotary movement, a lever fulcrumed in the bore of said pivot pin, a frame member carried by the pivot pin, said member being slotted, a bar whereof an end protrudes through the slot in the member, means operatively connecting the bar and an end of the lever, and manually actuatable means mounted upon the frame member, a cam carried by said manually actuatable means and adapted to engage the bar upon movement of said manually actuatable means to move the bar and actuate the lever and spring means between the bar and the member to oppose movement of the bar when the manually actuated means is actuated.

12. In a drafting machine, means fixed in orientation, a straight-edge supporting frame, means for latching said frame to said means fixed in orientation, reciprocating means for actuating said latching means, a tubular pivot pin mounting said frame for rotary movement, a lever fulcrumed in the bore of said pivot pin, a frame member carried by the pivot pin, said member being slotted, a bar whereof an end protrudes through the slot in the member, means operatively connecting the bar and an end of the lever, and manually actuatable means mounted upon the frame member, a cam carried by said manually actuatable means and adapted to engage the bar upon movement of said manually actuatable means to move the bar and actuate the lever.

13. In a drafting machine, means fixed in orientation, a straight-edge supporting frame, means for latching said frame to said means fixed in orientation, reciprocating means for actuating said latching means, a tubular pivot pin mounting said frame for rotary movement, a lever fulcrumed in the bore of said pivot pin, a frame member carried by the pivot pin, a bar relatively movable with respect to the member, means operatively connecting the bar and the upper end of the lever, manually actuatable means mounted upon the frame, an arcuate cam on the manually actuatable means and selectively engageable with the bar upon actuation of said manually actuatable means to actuate the lever and spring arms carried by the respective ends of the bar and crossing one another to engage the member to yieldingly oppose movement of the bar when the manually actuatable means is actuated.

14. In a drafting machine, means fixed in orientation, a straight-edge supporting frame, means for latching said frame to said means fixed in orientation, reciprocating means below said straight-edge supporting frame for actuating said latching means, a tubular pivot pin whereof a portion of the bore is of an increased diameter extending through said means fixed in orientation and mounting said frame for rotary movement below said means fixed in orientation, a handle fixed to said pivot pin above said first named means, a lever fulcrumed in the bore of smaller diameter, a frame member carried by the pivot pin, a handle affixed to the frame member, a pivotally mounted bar on the member, means operatively connecting the bar and the lever, manually actuatable means on the member, and a cam carried by the manually actuatable means and engageable with the end of the bar to oscillate the bar and thereby the lever.

15. In a drafting machine, means fixed in orientation, a straight-edge supporting frame, means for latching said frame to said means fixed in orientation, reciprocating means for actuating said latching means, a tubular pivot pin mounting said frame for rotary movement, a lever fulcrumed in the bore of the pivot pin, a frame member carried by the upper end of the pivot pin to which the handle is affixed and having a slotted wall, a bar whereof the end protrudes through the slot of the member, operative connections between the bar and the lever, said member being formed with flange means, manually actuatable means rotatably mounted upon said flange means and having an arcuate cam, the ends of which are selectively engageable with the respective ends of the bar upon actuation of said manually actuatable member to oscillate the bar and thereby the lever.

16. In a drafting machine, means fixed in orientation, a straight-edge supporting frame, means for latching said frame to said means fixed in orientation, a pivot pin mounting said frame for rotary movement below said means fixed in orientation, a lever fulcrumed in the pivot pin, a frame member carried by the upper end of the

pivot pin, a handle affixed to the frame member, said member being oppositely slotted, a bar whereof the ends protrude through the slots in the member, operative connections between the bar and the lever, manually actuatable means mounted upon the frame member, cam means carried by the manually actuatable means to selectively engage the respective ends of the bar and spring arms carried by the respective ends of the bar and crossing one another to engage the respective slots in the member and yieldingly oppose angular movement of the bar.

17. In a drafting machine, means fixed in orientation, a straight-edge supporting frame, means for latching said frame to said means fixed in orientation, reciprocating means for actuating said latching means, a pivot pin whereof the lower portion of the bore is of an increased diameter and extending through said means fixed in orientation and mounting said frame for rotary movement, a lever fulcrumed in the bore of smaller diameter and progressively decreasing in diameter towards its ends, a frame member carried by the upper end of the pivot pin, a bar, means operatively connecting the bar and the upper end of the lever, manually actuatable means rotatably mounted upon the frame member, a cam carried by the manually actuatable means and engageable with the bar upon oscillation of said manually engageable member to pivot the bar and spring means to yieldingly oppose movement of the bar when the actuatable means is actuated.

18. In a drafting machine, means fixed in orientation, a straight-edge supporting frame, means for latching said frame to said means fixed in orientation, reciprocating means for actuating said latching means, a pivot pin whereof the lower portion of the bore is of an increased diameter and extending through said means fixed in orientation and mounting said frame for rotary movement, a lever formed intermediate its ends with a circumferential bead fulcrumed in the bore of the pivot pin, a handle affixed to the pivot pin, a bar pivotally mounted and operatively connected with the lever, manually actuatable means carried proximate the handle, a cam carried by said manually actuatable means to pivot the bar.

19. In a drafting machine, means fixed in orientation, a straight-edge supporting frame, means for latching said frame to said means fixed in orientation, reciprocating means for actuating said latching means, a pivot pin mounting said frame for rotary movement, a lever fulcrumed in the bore, the upper end of the lever being formed with a ball, means carried by the upper end of the pivot pin, a bar pivotally mounted and formed with a recess receiving the ball on the lever, manually actuatable means mounted upon the last named means, and a cam carried by said manually actuatable means adapted to engage and pivot the bar.

20. In a drafting machine, means fixed in orientation, a straight-edge supporting frame, means for latching said frame to said means fixed in orientation, latch actuating means, pivot means mounting said frame for rotary movement, a lever carried in parallel relation with the pivot means, means to support the lever in position with respect to the pivot means, said lever supporting means being supported independently of the pivot means and positioning the latch actuating means, handle means carried by the upper end of the pivot means, manually actuatable means rotatably mounted with respect to the frame member and operative connections between the manually actuatable means and the lever for actuation thereof.

21. In a drafting machine, means fixed in orientation, a straight-edge supporting frame, means for latching said frame to said means fixed in orientation, reciprocating means for actuating said latching means, pin means extending through said means fixed in orientation and mounting said frame for rotary movement, a lever formed at the lower end with a block elongated in the direction of the latch actuating means, grooved means beneath the pivot pin supporting the latch actuating means receiving the block and handle means supported by the pivot means, manually actuatable means and operative connections between the manually actuatable means and the lever for actuation thereof.

22. In a drafting machine, means fixed in orientation, a straight-edge supporting frame, means for latching said frame to said means fixed in orientation, latch actuating means, a pivot pin formed with a bore and mounting said frame for rotary movement, a lever fulcrumed in the bore, a frame member carried by the upper end of the pivot pin having a slotted wall, a bar whereof an end protrudes through the slot in the member to actuate one end of the lever, and manually actuatable means mounted upon the frame member to engage the bar upon movement of said manually actuatable means to move the bar and actuate the lever.

23. In a drafting machine, in combination, means fixed in orientation, a straight edge supporting frame, means to latch said frame to said means fixed in orientation, tubular pivot means mounting said frame for rotary movement, a lever fulcrumed in the bore of said tubular pivot means, annular means rotatably mounted about the pivot means, operative connections between the lever and the latch, handle means carried by the pivot means comprising at least one fulcrum, means to actuate said lever from said rotatably mounted means comprising bar means, means supporting the bar means for movement about at least one fulcrum, spring means urging the bar toward the fulcrum, and operative connections between the rotatably mounted means and the bar means whereby rotation of said rotatably mounted means actuates the latch means.

LEENDERT KETTING.