April 25, 1944. H. WIEDEMANN 2,347,625

DRAFTING MACHINE

Filed May 7, 1941 3 Sheets-Sheet 1

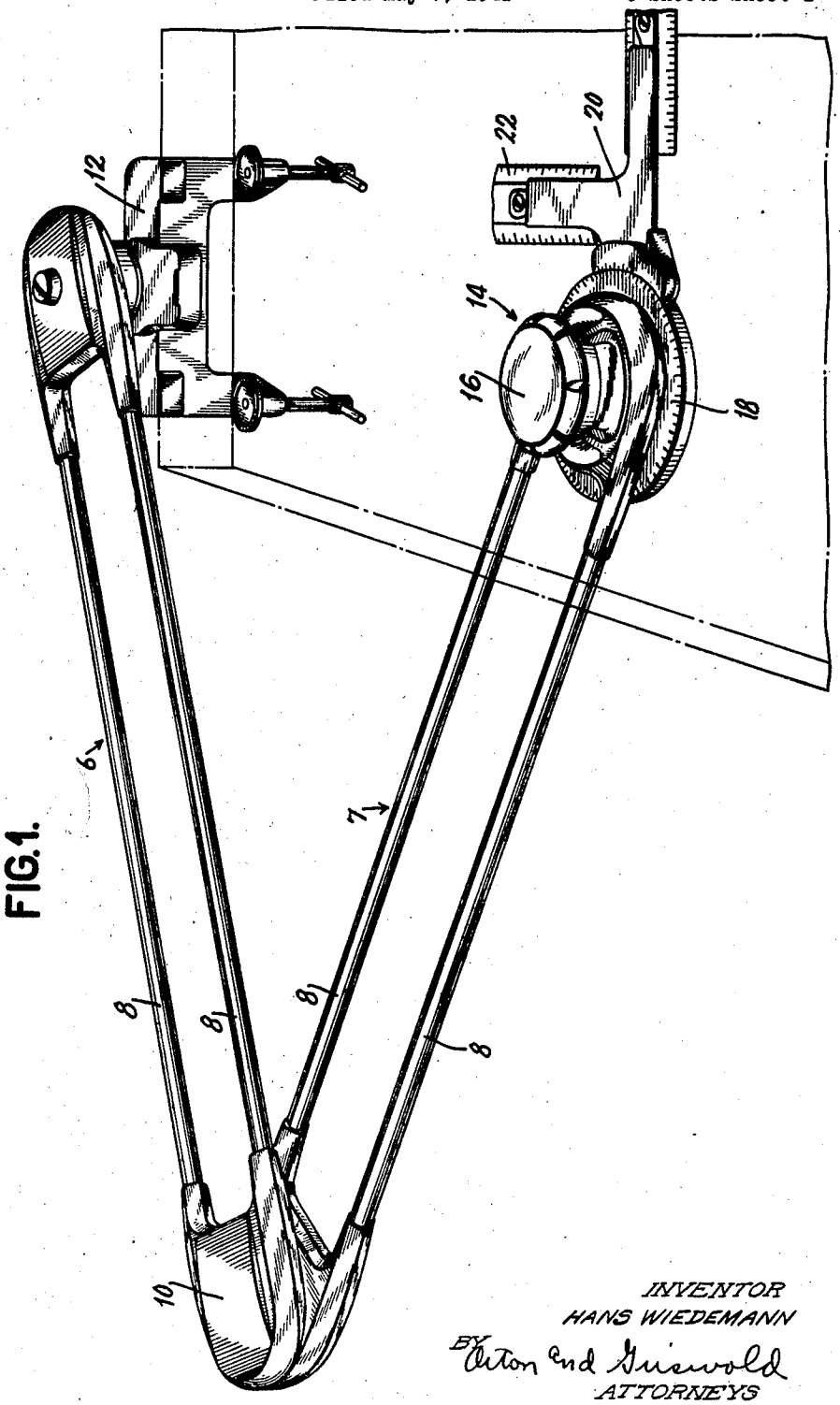


FIG. 1.

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DRAFTING MACHINE

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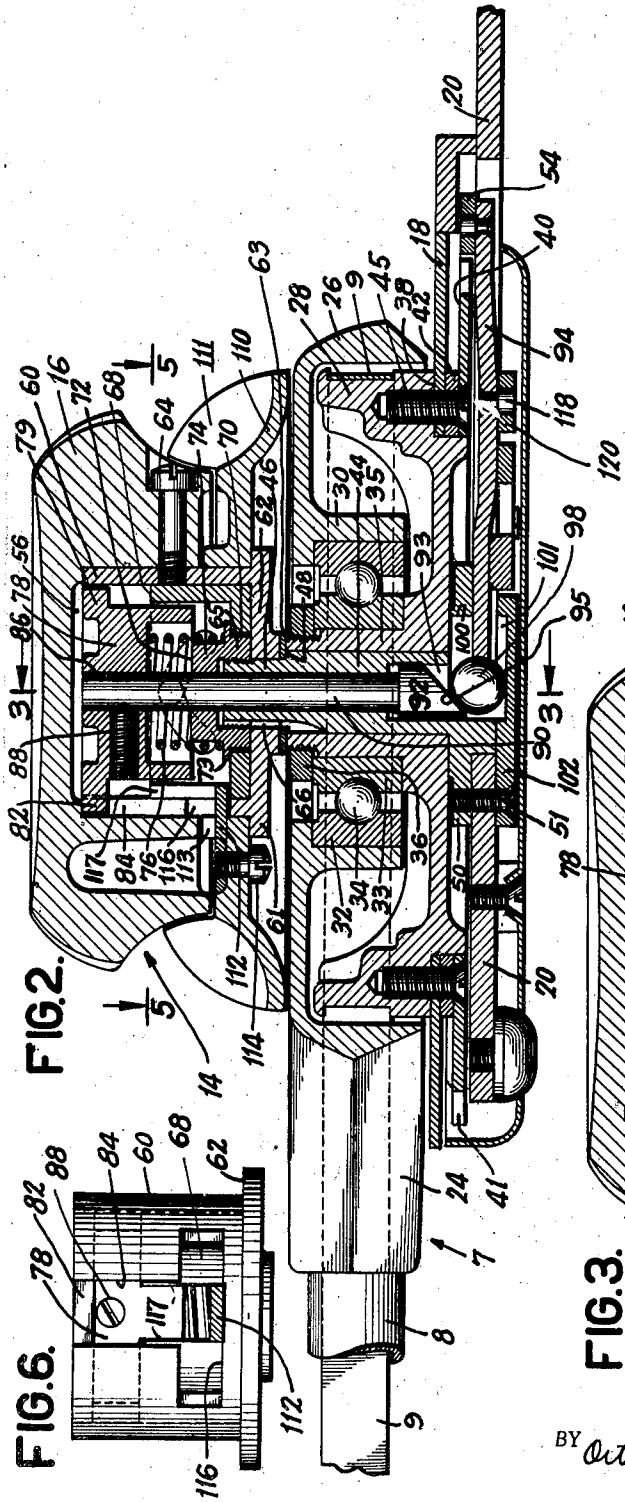


FIG. 2.

FIG. 6.

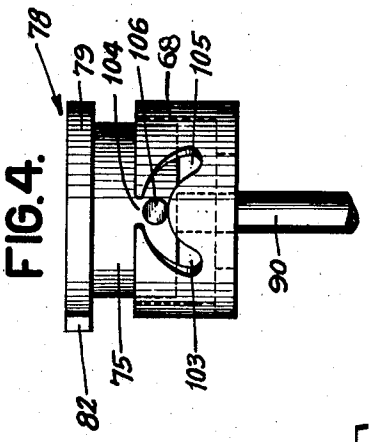


FIG. 4.

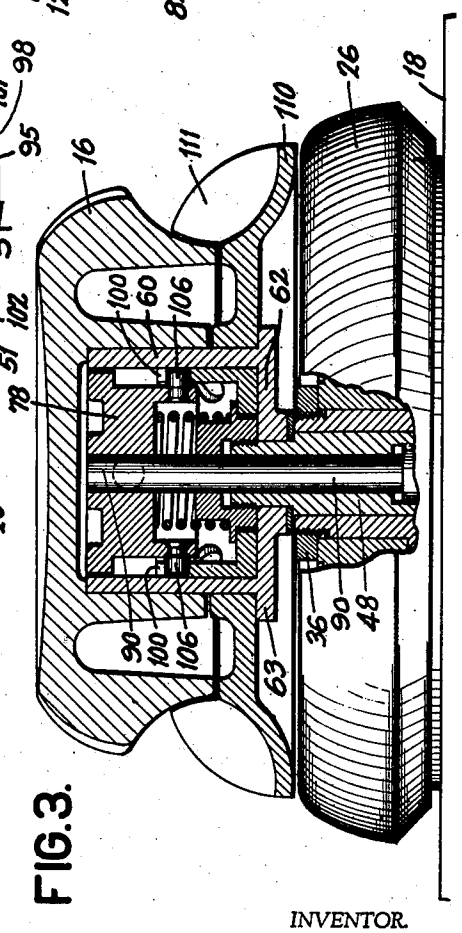


FIG. 3.

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DRAFTING MACHINE

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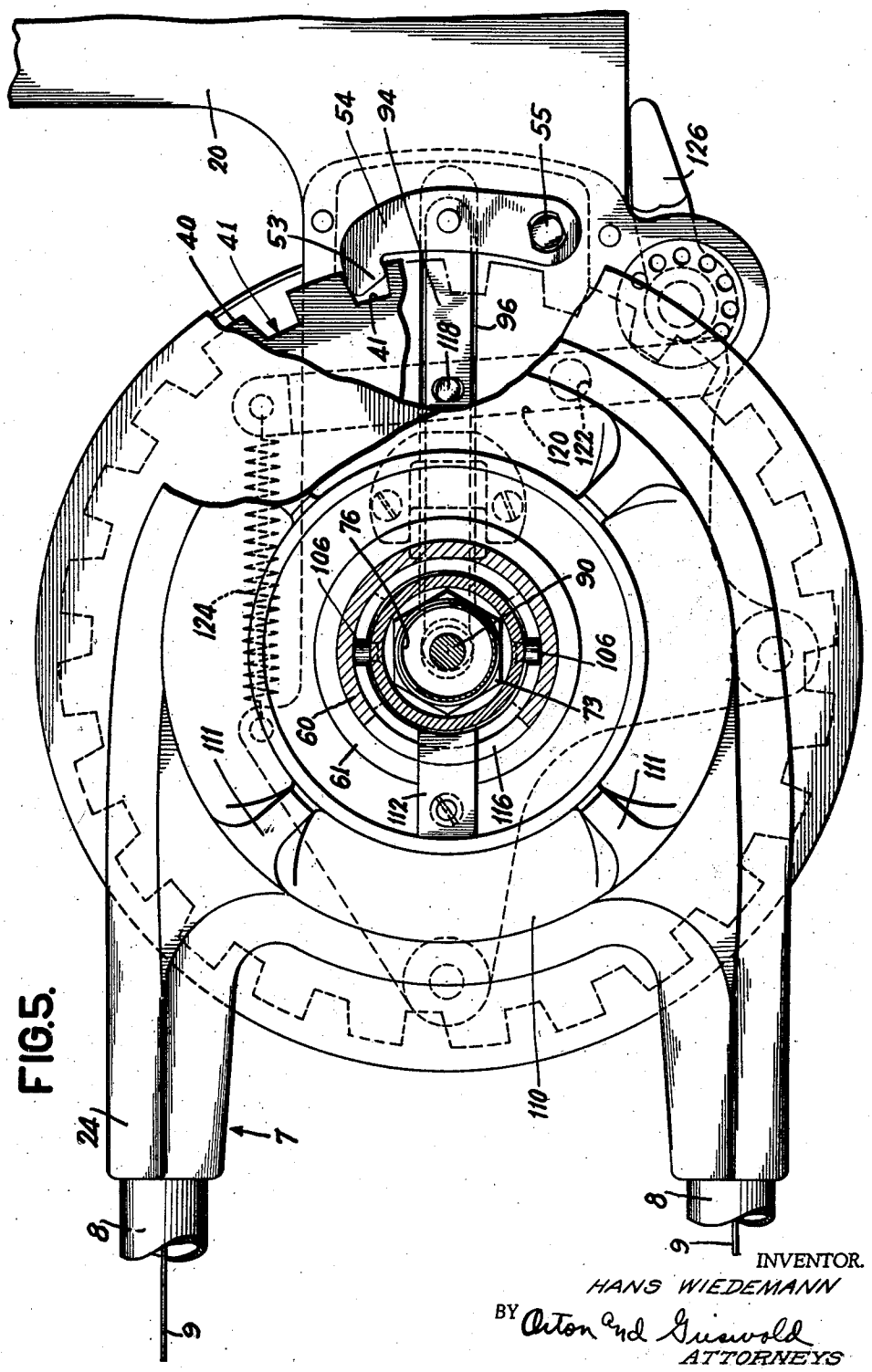


FIG.5.

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Patented Apr. 25, 1944

2,347,625

UNITED STATES PATENT OFFICE

2,347,625

DRAFTING MACHINE

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Application May 7, 1941, Serial No. 392,239

15 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 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 stop mechanism for the straight-edges which may conveniently be actuated by either the thumb or a finger, as found most convenient, of the hand manipulating the knob to move the straight-edges 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 straight-edges 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 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 simpify assembly and to avoid the necessity of 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 and convenience in manufacture and 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 perspective view showing the drafting machine of this invention 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 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;

Figure 4 is a fragmentary view in outside elevation of the specific instrumentalities by which the rotary movement of the manually actuated device is changed to a movement of translation;

Figure 5 is a plan view taken in the planes indicated by the line 5—5 of Figure 2, looking in the direction of the arrows, parts being removed to show details of construction; and

Figure 6 is a detail view showing in elevation, the knob carrying frame of this invention.

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 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 of arm 7 extend into and are retained in a frame member 24 of the head, which frame member comprises an outer flange 26 within which the pulley 28 turns. Inwardly of flange 26 is a cylindrical flange 30 con-

centric with the axis of the head. Rotatably mounted within the cylindrical flange 30, as by the ball recess 32, 33 and ball bearings 34, is a cylindrical hub portion 35 which is integral with the pulley 28 and retains the bearing member 33 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 arm portion 26 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 whereby the locking plate 40 and the protractor 18 are fixed, in spaced relation, to the pulley by means of the screw or other securing means 45. Within the 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 51.

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 comprised of the cylindrical or annular wall 60 and a bottom wall 62 which extends beyond the circumferential margin of the wall 60 as at 61 to support a manually actuatable device controlling the latch 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. A nut 65 is threaded on to the reduced portion 46 of pivot pin 44 to seat the bottom wall 62 of the knob frame 60—62 against spacing ring 63 on shoulder 48. Rotary movement of the knob 16 and hence of the frame member 60—62 will turn the sleeve-like pivot pin 44 (within hub 35) and with it the straight-edge supporting frame 20.

The manually actuatable devices controlling the latch are carried by the knob 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. Rotatable within the cup-shaped member 60—62 is a cup-shaped female member 68 having in its bottom an axial aperture 70 within which extends a cylindrical thrust member portion 74 of the nut 65 which is threaded on the end of the pivot sleeve 44. Female member 68 is positioned by a flange 73. The thrust member portion 74 receives one end of the coil spring 76 which bears against the bottom of an actuated inverted male member 78 also within the female member 68. The male member 78 has a peripheral flange 79 at its uppermost portion by which it is guided by the wall 60 of the knob frame. The male member 78 is positioned against rotation with respect to the knob frame 60—62 by means of a lug or key 82 disposed in a longitudinal slot 84 formed in the wall 60 of the knob frame.

The actuated male member 78 is provided with an axial bore 86 within which is fixed, as by the set screw 88, an axially disposed plunger 90 disposed in the bore of the pivot member 44 and having, at its lower end, a cylindrical head 92 within an enlarged portion 93 of the bore of the pivot member 44. The head 92 is conveniently formed with an angularly related or bevelled surface 95 serving as a cam.

The latch 54, Figure 5, which is pivoted at its one end, as at 55, is connected to a slide 94 which reciprocates in a radially extending slot 96 formed in the straight-edge supporting frame 20. This slide extends toward the axis of the head to a point where it can be engaged by a ball 98 movable in an axially extending recess formed by a cut-away portion 100 in the integral flange 50, the straight-edge supporting plate 20 and a cut-away portion 101 in a supplemental plate 102 secured to the straight-edge supporting frame 20 by means of the screws 51. Thus when the plunger 90 is pressed downwardly, it displaces the ball 98 to the right, as viewed in Figure 1, and moves the slide 94 in a direction to release the latch 54 from a recess 41 in the latching plate 40. The plunger 90 is reciprocated in the following manner: The upper edge of the female cup-shaped member 68 is formed with a slot 104 branching in two arms 103, 105 in opposite directions in a generally downward direction. Slot mouth 104 normally receives a pin 106 secured to the outer surface 75 of the actuatable member 78 and which pin moves in either branch slot depending on the direction of rotation of the female actuator 68. Preferably there are two such pins and associated slots diametrically opposite one another.

Carried between the outwardly extending flange portion 61 of the member 60—62 and the knob 16 is an annular rotatable member 110 which may be likened to a star wheel and is provided with spaced substantially radially extending finger grips or fins 111. This member is loosely rotatable on the member 60—62 but is constrained to a limited arcuate displacement with respect thereto by means of a finger 112 positioned in a groove 113 in the hub of the annulus 110 and secured thereto as by a screw 114. Finger 112 passes through a slot portion 116 of extended arcuate width in the wall 60 of the knob supporting frame 60—62 which is shown as opening into the slot 84 therein. The finger also extends into a longitudinal slot 117 in the female member 68. Thus when the control member 110 is rotated, the finger 112 moves the female member 68 through the same angle to reciprocate the plunger 90.

The cooperating latching member is shown in greater detail in Figure 5 as an angularly shaped lever 54 formed with the detent 53 at its one end which is shaped as to enter into and position itself in one of the latching recesses 41 formed in the latching plate 40. The other extremity of the arm 54 is formed with an aperture for reception on a pin 55 mounted on the straight-edge supporting frame. The lever 54 is normally urged toward the latching plate 40 by the engagement, in a slot in the slide 94, of a pin 118 carried by a lever 120 pivoted as at 122, to the frame member 20. The free end of this lever is urged toward the axis of the head, as by a spring 124, whereby the normal tendency of the lever is to move the slide 94 inwardly to draw the detent 53 into engagement with the latching disc 40.

In order to hold the straight-edge at points intermediate the registering position of the notches, a locking member 126 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 member may be provided within the purview of this invention and no further discussion thereof is deemed necessary.

The operation of the device is apparent from the foregoing description. Suffice it to say that a draftsman may release the straight-edges by rotating the star wheel 110 by the thumb or finger of the same hand which engages the knob and without removing the hand from the knob. Rotation of annulus 110 in either direction rotates the female member 68 and brings the upper and outer wall of one of the slots 103 or 105 (depending upon the direction of rotation of the star wheel) into engagement with the pin 106. This wall serves as camming means which urges the pin 106 downwardly, bringing with it the male member 78. Member 78 being secured to the plunger 90, it depresses the plunger and causes the cam face 95 to displace the ball 93 radially to move the slide 94 in a direction to move the latch to disengaged position. Upon release of the annulus 110 and thereby the release of the spring 76, the spring forces the male member 78 upwardly carrying with it the reciprocating plunger 90. The resultant upward movement of the pin 106 causes the female member 68 and the annulus 110 to turn and resume their normal positions. When the plunger is raised, the spring 124 moves the slide 94 inwardly, thereby restoring the ball to its position of rest substantially at the axis of the head and permitting the latch 54 to be re-engaged with the latching plate 40.

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, in combination, a supporting head adapted for free translatory movement over a drafting board comprising first latching means, straight-edge supporting means, means for maintaining said latching means relatively fixed in orientation, pivot means rotatably supporting said straight-edge supporting means, a second latching means, means mounting one of said latching means for movement into and out of engagement with the other latching means, power storing means normally urging said movably mounted latching means into engagement with the other latching means, plunger means axially reciprocable with respect to said straight-edge supporting means, cam means on said plunger, manually actuatable coacting cam means to engage and depress the first named cam means for axially reciprocating said plunger and means for moving one of said latching means between released and engaged positions with respect to the other latching means in response to reciprocatory axial movement of said plunger.

2. In a drafting machine, in combination, a supporting head adapted for free translatory movement over a drafting board comprising latching means, straight-edge supporting means, means for maintaining said latching means relatively fixed in orientation, pivot means rotatably supporting said straight-edge supporting means, coacting latching means, means mounting one of said latching means for movement into and out of engagement with the other latching means, power storing means normally urging said movably mounted latching means into engagement with the other latching means, plunger means reciprocable with respect to said straight-edge supporting means, a pin on said plunger, a cylindrical member rotatably carried by the head and formed with an arcuate slot whereof the respective ends are in a lower plane than the intermediate portion and receiving the pin for reciprocating said plunger when said member is turned and means for moving said movable latching means between released and engaged positions in response to reciprocatory movement of said plunger.

3. In a drafting machine, in combination, a supporting head adapted for free translatory movement over a drafting board comprising latching means, straight-edge supporting means, means for maintaining said latching means relatively fixed in orientation, pivot means rotatably supporting said straight-edge supporting means, a knob on the pivot means, coacting latching means, means mounting one of said latching means for movement into and out of engagement with the other latching means, power storing means normally urging said movably mounted latching means into engagement with the other latching means, rotatable control means carried by the knob, plunger means movable with respect to said straight-edge supporting means and knob and extending therebetween, a male member carried by the plunger, a cylindrical coacting female member actuated by the control means, pin and slot connections between the two members for reciprocating said plunger, said female member being rotatable on said knob and means urging said members in opposite directions.

4. In a drafting machine, in combination, a supporting head adapted for free translatory movement over a drafting board comprising latching means, straight-edge supporting means, means for maintaining said latching means relatively fixed in orientation, pivot means rotatably supporting said straight-edge supporting means, a knob on the pivot means, coacting latching means, means mounting one of said latching means for movement into and out of engagement with the other latching means, power storing means normally urging said movably mounted latching means into engagement with the other latching means, plunger means supporting for reciprocatory movement relative to said straight-edge supporting means and relative to said knob, a cam on the lower end of said plunger, a slide secured to said movable latching means having an end adjacent said plunger, a ball interposed between the cam surface on the plunger and the said end of the slide, a rotatable member carried by the head, operative connection between the rotatable member and the plunger to reciprocate the same whereby rotation of said rotatable member is translated into sliding movement of the slide by the same hand of the operator as is used to grasp said knob and said movable latching means is moved out of engagement in response to movement of said plunger.

5. In a drafting machine, in combination, a supporting head adapted for free translatory movement over a drafting board comprising latching means, straight-edge supporting means, means for maintaining said latching means relatively fixed in orientation, pivot means rotatably supporting said straight-edge supporting means,

a knob on the pivot means, coacting latching means, means mounting one of said latching means for movement into and out of engagement with the other latching means, power storing means normally urging said movably mounted latching means into engagement with the other latching means, plunger means supported for reciprocatory movement relative to said knob and relative to said straight-edge supporting means, means carried by said knob for moving said plunger means comprising telescoping cam means in operative relation to said plunger, an annulus rotatably mounted on the knob in a position to be moved by the same hand of an operator as is used to grasp said knob, and ball and cam means coupling said movable latching means to said plunger for moving said movable latching means out of engagement with said other latching means in response to movement of said plunger.

6. In a drafting machine, in combination, a supporting head adapted for free translatory movement over a drafting board comprising latching means, straight-edge supporting means, means for maintaining said latching means relatively fixed in orientation, pivot means rotatably supporting said straight-edge supporting means, a knob coupled to the pivot means, coacting latching means, means mounting one of said latching means for movement into and out of engagement with the other latching means, power storing means normally urging said movably mounted latching means into engagement with the other latching means, plunger means supporting for reciprocatory axial movement relative to said knob and relative to said straight-edge supporting means, means carried by the pivot means and rotatable in a plane transverse to the axis thereof and disposed adjacent said knob in a position to be moved at any point on its periphery by the same hand of an operator as is used to grasp said knob and coupled to reciprocate said plunger axially, and means coupling said movable latching means to said plunger for moving said latching means out of engagement with said other latching means in response to axial movement of said plunger.

7. In a drafting machine, in combination, a supporting head adapted for free translatory movement over a drafting board comprising latching means, straight-edge supporting means, means for maintaining said latching means relatively fixed in orientation, pivot means rotatably supporting said straight-edge supporting means, a knob on the pivot means, coacting latching means, means mounting one of said latching means for movement into and out of engagement with the other latching means, power storing means normally urging said movably mounted latching means into engagement with the other latching means, plunger means supported for reciprocatory movement relative to said knob and relative to said straight-edge supporting means, an annular groove in said knob, an annulus operatively connected to said plunger and rotatable in said groove for manually moving said plunger, and means coupling said movable latching means to said plunger for moving said movable latching means out of engagement in response to movement of said plunger.

8. In a drafting machine, in combination, a supporting head adapted for free translatory movement over a drafting board comprising latching means relatively fixed in orientation, straight-edge supporting means pivotally supported for manual rotation relative thereto by a knob coupled to said straight-edge supporting means and disposed thereabove and having a device for securing said straight-edge supporting means against pivotal movement comprising a pawl mounted on said straight-edge supporting means for movement between a position engaging said latching means and a position disengaged therefrom, a pawl control device comprising plunger means supported for reciprocatory movement relative to the axis of said tool, an annular member in a position to be moved by the same hand of an operator as is used to grasp said knob, means actuating said plunger to move said pawl between said engaged and said disengaged positions comprising male and female members, the male member of which is secured to the plunger and the female member of which is actuated by the annular member, power storing means tending to separate said members, at least one pin carried by one of said members, said other member being formed with at least one cam groove engageable by a pin to cam the male member downwardly upon rotation of the pin in either direction, a slide connected to the pawl, coacting cam means carried by the plunger and the slide to move said pawl to disengaged position.

9. In a drafting machine, in combination, a supporting head adapted for free translatory movement over a drafting board comprising a latching plate, straight-edge supporting means, means for maintaining said latching plate relatively fixed in orientation, tubular pivot means rotatably supporting said straight-edge supporting means, a pawl, means mounting the pawl for movement into and out of engagement with the latching plate, power storing means normally moving the pawl into engagement with the latching plate, a cup-shaped frame member secured to the pivot means and formed with a peripheral flange, a knob secured to the wall of the cup-shaped frame member in spaced relation to the flange, the wall of said frame member being formed with a longitudinally extending slot terminating proximate the flange in a peripherally extending slot, an annular control member rotatably supported on the flange, a finger carried thereby and extending through the last named slot in the frame member, a thrust member carried by the pivot means within the cup-shaped frame member, a plunger within the tubular pivot means and extending thereabove, a male member carried on the upper end of the plunger having a peripheral flange slidably guided in the cup-shaped frame member and formed with a lug reciprocable in the first named slot therein, power storing means between the thrust member and the male member, a female member within the first named frame member and formed with a longitudinally extending slot receiving the finger on the annular control member, diametrically disposed pin and slot connections between the male and female members to depress the plunger, a cam on the lower end of the plunger, a slide operatively connected with the pawl and a ball between the cam and slide to move the slide to disengage the pawl from the latching plate when the plunger is in depressed position.

10. In a drafting machine, in combination, a supporting head adapted for free translatory movement over a drafting board comprising latching means relatively fixed in orientation, straight-edge supporting means, tubular pivot means supported for manual rotation and coupled to said straight-edge supporting means and dis-

posed thereabove and having a device for securing said straight-edge supporting means against pivotal movement comprising a pawl mounted on said straight-edge supporting means for movement between a position engaging said latching means and a position disengaged therefrom, a pawl control device comprising axially movable plunger means supported for reciprocatory movement axially within said tubular pivot means, means coupling said plunger to move said pawl between said engaged and said disengaged positions, a knob on the pivot means, power storing means tending to engage said pawl and means to actuate the plunger positioned adjacent the knob to be moved by the same hand of an operator as is used to grasp said knob.

11. In a drafting machine, a member fixed in orientation, a straight-edge supporting frame, means for latching said frame to said member, a pivot pin having a generally tubular portion extending through said member mounting said frame for rotary movement below said member, a knob fixed to said pivot pin above said member, a rod axially reciprocable within the generally tubular portion of said pivot pin, means adjacent the knob to axially reciprocate said rod, a cam surface at the lower end of said rod, and means below said member moved by the cam surface at the lower end of said rod engaging and actuating said latching means.

12. In a drafting machine, a member fixed in orientation, a straight-edge supporting frame, means for latching said frame to said member, a pivot pin having a generally tubular portion extending through said member mounting said frame for rotary movement below said member, a knob fixed to said pivot pin above said member, a rod reciprocable within the generally tubular portion of said pivot pin, means adjacent the knob to reciprocate said rod, a cam surface at the lower end of said rod, a ball adapted to be engaged by said cam surface, and means below said member moved by said ball under the influence of said rod for actuating said latching means.

13. In a drafting machine, a member fixed in orientation, a straight-edge supporting frame, means for latching said frame to said member, a pivot pin having a generally tubular portion extending through said member mounting said frame for rotary movement below said member, a knob fixed to said pivot pin above said member, a rod axially reciprocable within the generally tubular portion of said pivot pin, rotary means adjacent said knob, means responsive to rotation of said rotary means for axially reciprocating said rod, and means below said member engaged by said rod and engaging and actuating said latching means in response to axial reciprocation of said rod.

14. In a drafting machine, a member fixed in orientation, a straight-edge supporting frame, means for latching said frame to said member, a pivot pin having a generally tubular portion extending through said member mounting said frame for rotary movement below said member, a knob fixed to said pivot pin above said member, a rod axially reciprocable within the generally tubular portion of said pivot pin, rotary means adjacent said knob and rotatable in either direction, operative connections between said rotary means and said rod and responsive to rotation of said rotary means in either direction to reciprocate said rod axially, and means below said member for actuating said latching means in response to axial reciprocation of said rod.

15. In a drafting machine, a member fixed in orientation, a straight-edge supporting frame, means for latching said frame to said member, a pivot pin having a generally tubular portion extending through said member mounting said frame for rotary movement below said member, a knob fixed to said pivot pin above said member, a rod reciprocable within the generally tubular portion of said pivot pin, rotary means adjacent said knob, two concentric tubular elements, one element fixed to said rod, the second element connected to said rotary means and cam means between said elements to cause axial reciprocation of said one element and said rod upon rotation of said second element, and means below said member for actuating said latching means in response to reciprocation of said rod.

HANS WIEDEMANN.

CERTIFICATE OF CORRECTION.

Patent No. 2,347,625. April 25, 1944.

HANS WIEDEMANN.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 2, first column, line 3, for the word "recess" read --races--; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 8th day of August, A. D. 1944.

Leslie Frazer

(Seal)

Acting Commissioner of Patents.