March 15, 1949. L. KETTING 2,464,585

DRAFTING MACHINE

Filed May 24, 1944 3 Sheets-Sheet 1

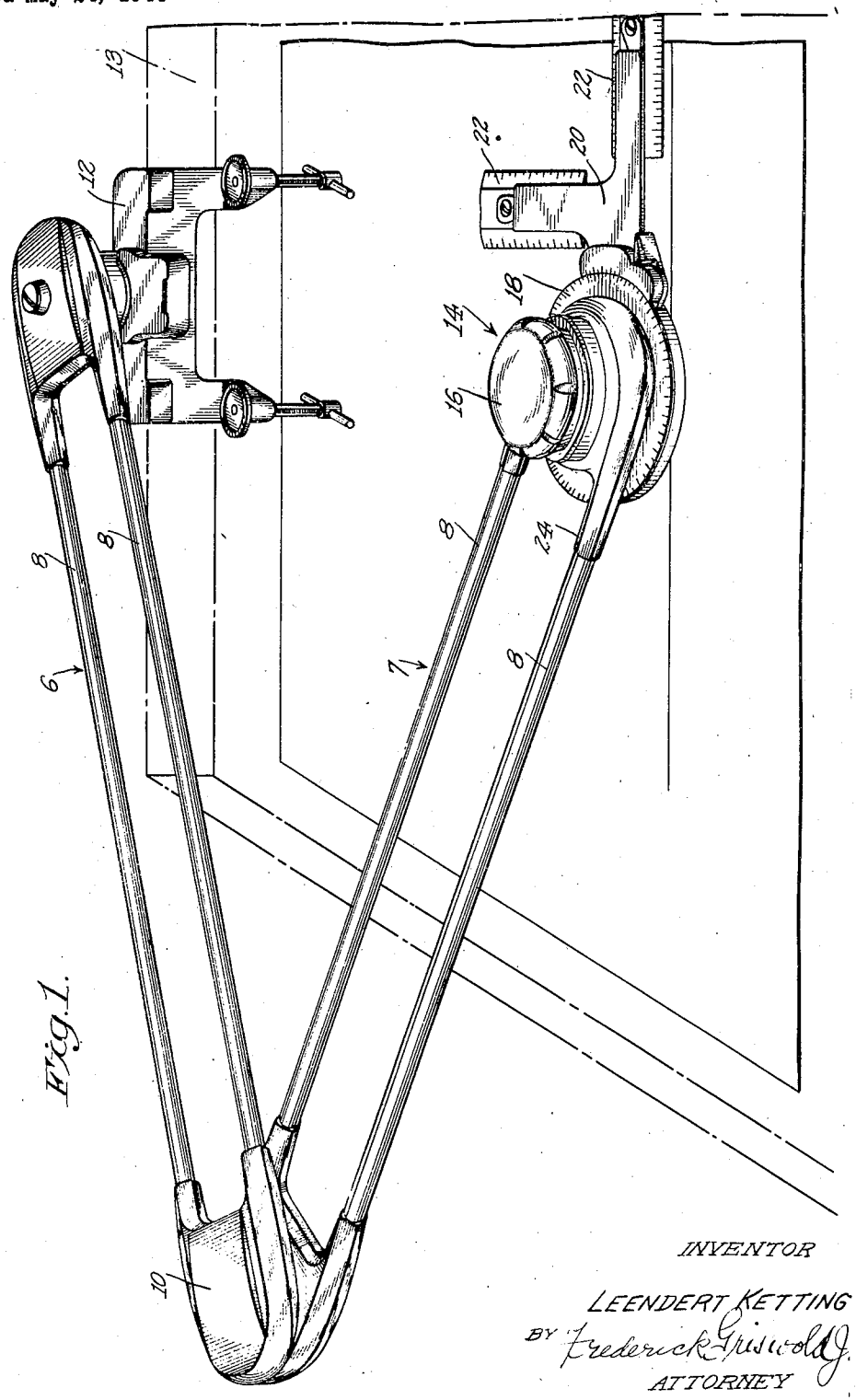


Fig. 1.

INVENTOR
LEENDERT KETTING
BY Frederick Griswold J.
ATTORNEY

March 15, 1949. L. KETTING 2,464,585

DRAFTING MACHINE

Filed May 24, 1944 3 Sheets-Sheet 2

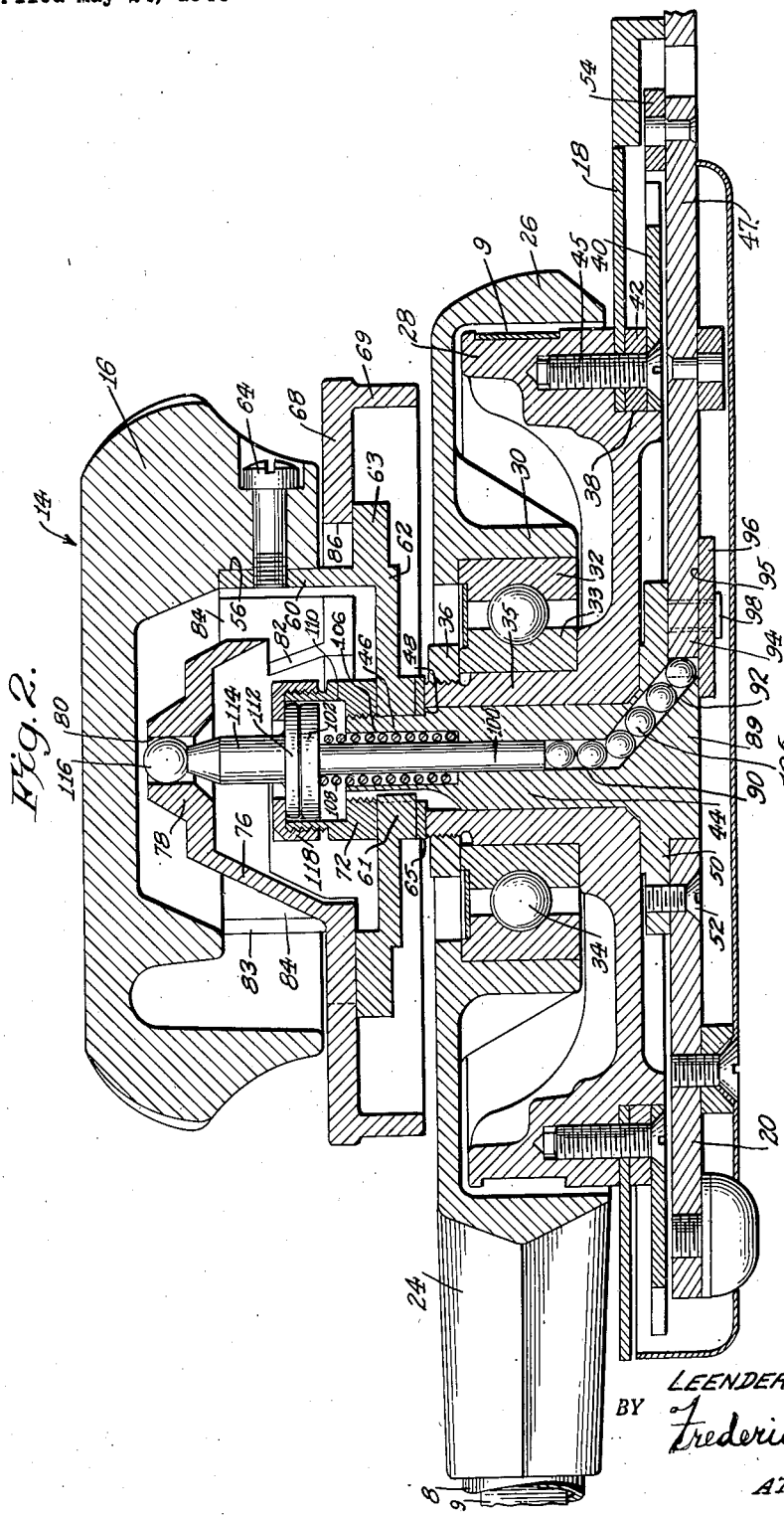


Fig. 2.

INVENTOR.
LEENDERT KETTING
BY Frederick Griswold Jr
ATTORNEY

March 15, 1949. L. KETTING 2,464,585

DRAFTING MACHINE

Filed May 24, 1944 3 Sheets-Sheet 3

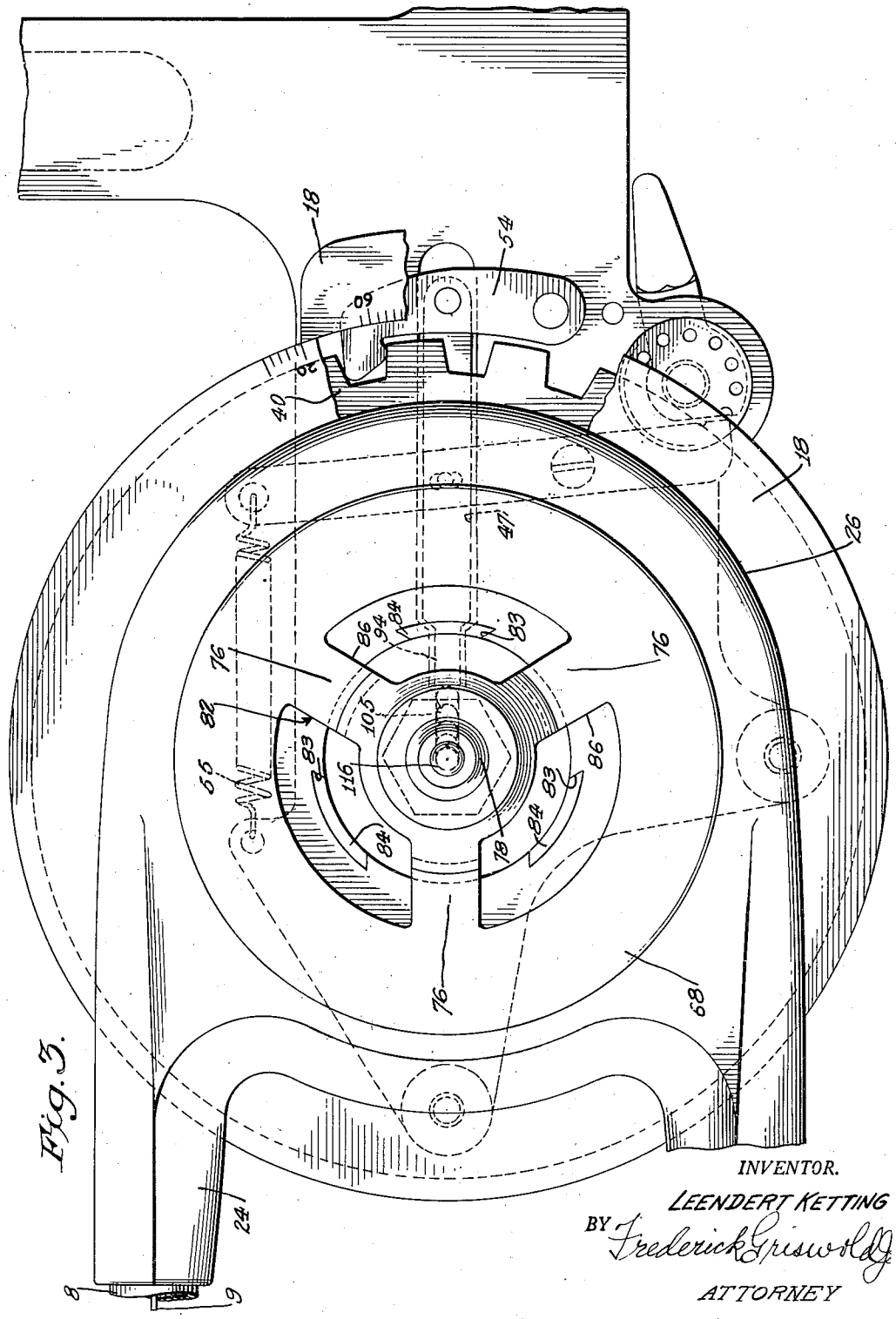


Fig. 3.

INVENTOR.
LEENDERT KETTING
BY Frederick Griswold
ATTORNEY

Patented Mar. 15, 1949 2,464,585

UNITED STATES PATENT OFFICE

2,464,585

DRAFTING MACHINE

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

Application May 24, 1944, Serial No. 537,097

11 Claims. (Cl. 33—79)

1

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 by the thumb or a finger without moving the hand from the actuating knob on the protractor head.

It is also an object of the invention to effect the releasing of latching means for the straight-edges by a movement of the hand of the operator which is similar to the movement of any one of the fingers or thumb in grasping the knob.

The invention also has for one of its objects locking and releasing mechanism for the scale frame 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 disc or plate is preferably provided on the knob, which disc or plate is movable laterally by pressure at any point about its periphery 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 scale frame at the nearest even predetermined angular position indicated on the protractor.

Another object of the invention is to return the disc on the knob to initial position whenever it

2

is released by the operator. Accordingly, power is stored in power storing devices when the disc or plate is moved from initial position and which is utilized to return the disc.

The invention further seeks an instrumentality converting the substantially horizontal movement of the thumb or finger actuated device to vertical movement of the latch actuating devices for the straight-edges 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; and

Figure 3 is a plan view of the head with the knob removed to show details of the actuating structure.

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 (Figure 2) 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 and the invention is applicable to types of parallel motion mechanisms other than the wheel and band type illustrated.

As shown, the tubes 8 extend into a frame member 24 comprising an outer flange 26 within which the pulley 28 (Figure 2) turns. Inwardly of flange 26 is a cylindrical flange 30 concentric with the axis of the head 14. 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 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 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 latching 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 28 by means of the screw 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 latch 54 is shown as actuated by a slide 47. The knob 16 is operatively connected with the pivot pin in the following manner:

The knob 16 is recessed, as at 58, 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. Proximate the bottom 62, there is illustrated a flange 63 extending beyond the circumferential margin of the wall 60 to serve as a support for a manually actuatable device 68—80 controlling the pawl 54 as hereinafter described. The upper end 46 of the tubular pivot pin 44 is held in position by a nut-like tubular member 72 threaded on the upper end of the pivot member 44 and seating on the bottom wall 62 of the cup-shaped member to retain the latter against the spacing ring 65 on shoulder 48. Thus the pulley 28 and knob frame 60—63 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 knob 16 is secured to the frame wall 60 as by at least one screw 64 whereby rotary movement of the knob and with it the frame member 60, 62 will turn the pivot pin 44 and thereby the straight-edge supporting frame 20. The bottom surface of a hub portion 61 of the knob frame rests on the spacing ring 65 which is supported on shoulder 48 of pivot pin 44. The cup-shaped member 60—63 and pivot pin 44 are thus rotatable as a unit with respect to pulley 28.

The manually actuatable devices controlling the latch are carried above the level of the arm and in a position to be operated by a digit of the same hand of an operator as is used to grasp the knob. As shown, the manually actuatable device takes the form of an annular disc 68 which, as illustrated, is comprised of an upwardly extending frusto-conical convex central portion 76, and a finger-engageable downwardly extending annular rim portion 69. Centrally the upwardly extending convex portion 76 of the disc is shown as formed with an upwardly extending frusto-conical portion 78 formed axially with an aperture or tubular passage 80. Conveniently, the frusto-conical convex portion 76 and the adjacent disc portion are formed with slots or apertures 82 as shown in Figures 2 and 3.

The knob frame portion 60 is conveniently provided with an annular series of slots 83 extending conveniently, as shown in Figure 2, the depth of the wall 60, above the flange 63, that is, to the plane of the upper surface of the flange 63. These slots 83 define, preferably, three equal wall segments 84 preferably equally spaced from one another and of relatively short arcuate length to define relatively wide spaces therebetween. Slots 86 are formed in the manually actuatable device 68 and in the lower part of the convex portion 76 and are segmental in shape and are relatively wide so as to loosely receive or fit over the segmental wall portions 84 with freedom of movement whereby transverse displacement of the actuating disc 68 is freely permitted.

As before explained, the pivot pin 44 is shown as formed, below the plate-like bottom portion 50, with a disc-like enlargement 89. It is also formed with an axial bore 90 extending from the upper end to a point, as shown, in substantially the plane of the disc portion of the pulley 28. From that point, the bore is inclined downwardly and outwardly, as at 92, to the periphery of the enlargement 89 in register with the inner end of the slide which conveniently may be constricted to substantially the diameter of the bore 90, 92, as shown at 94. The constricted portion 94 enters a groove or passage 95 formed in a block 96 secured as by the devices 98 to the frame member 20. The passage 92 is in register with the bore 90 and forms a continuation thereof. Within the axial portion 90 of the bore, a rod-like plunger 100 is disposed which is conveniently provided with a plate or disc 102 at its upper end in spaced relation to the upper end of the pivot pin 44. The plunger 100 terminates short of the lower end of the axial bore 90 and the remainder of the axial bore 90 and the inclined bore 92 is filled with balls 105, say, of steel, which are prevented from escaping by the end 94 of the reciprocable member 47.

The bore in the upper end of the pivot pin 44 is enlarged as indicated at 106 and receives a yielding element shown as the coil spring 108 surrounding the plunger 100. This coil spring 108 normally extends beyond the upper end of the pivot pin and engages the disc-like plate 102 to urge it and the plunger 100 upwardly in the bore of the pivot pin. Resting on the pivot pin plate 102 is a similar plate 112 carried on the bottom of a short rod 114 having a tapered upper end terminating in a spherical end 116 normally disposed within the passage 80 in the actuating member 68. The element 112—116 is retained in position by the collar 118 adjustably threaded on the nut-like member 72. Thus the nut-like member 72 and the collar 118 function as a cage to retain and permit relative movement of the camming member 112, 116 in actuating the latch 54. It will be obvious that when the element 114 is tipped about its vertical axis by reciprocation or lateral movement of the disc 68, the plate 112 will be fulcrumed on the collar 118 at one side, thereby causing the opposite side of the plate 112 to move downwardly and thereby forcing the plate 102 on the plunger 100 to move downwardly to depress the plunger and propel the balls downwardly and actuate the latch actuating member 47. Release of force on the element 114, 116 will permit the parts, including the latch, to return to initial position under the influence of spring 55. The ball 116 on the cam member 114 affords universal movement and the tipping or angular displacement of the element 114 in any direction will result in camming down the plunger 100 to actuate and release the latch 54. So soon as this

camming member 114 is released, the plunger 100 is returned to its original position under the influence of the spring 108.

It will be readily appreciated, therefore, that whenever the plunger 100 is depressed, the series of balls 105 will be forced downwardly in the passage 90, 92 pressing against the end 94 of the reciprocable member and displacing it to the right, as viewed in Figure 2, to actuate the latch 54 against the reaction of the spring 55. Obviously, while elements such as steel balls 105 are shown between the plunger 100 and the reciprocable member 47, any elements transmitting the transverse movement of the disc 68, 78 to the reciprocably movable member 47 in order to actuate the latch 54, are within the purview of the invention.

It will also be appreciated that the plunger and balls constitute, in effect, a flexible element functioning in the manner of a bowdoin wire or the equivalent and the term "flexible element" is intended to encompass any power transmitting element extending from the cam structure of the disc to the latch or to any extent intermediate these two elements.

Various modifications will occur to those skilled in the art in the configuration and disposition of the camming device and the instrumentalities actuating the same 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, means fixed in orientation, a straight-edge supporting frame, means to latch said frame to said means fixed in orientation, means mounting said straight-edge supporting frame for rotary movement, planar means mounted for movement in any direction in a plane substantially parallel to the plane of said means fixed in orientation to release said latching means.

2. 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, means mounting said straight-edge supporting frame for rotary movement, a knob rotatable with respect to the mounting means and said frame, means movable radially in any direction with respect to said knob, operative connections between the last named means and the latch means to release said latch means by any radial movement of said means.

3. In a drafting machine, in combination, means fixed in orientation, a straight-edge supporting frame, a latching plate carried by one of said means, latching means carried by the other said means and co-acting with the latching plate, means mounting said straight-edge supporting frame for rotary movement, a knob fixed to said mounting means, means movable in any horizontal direction parallel with said straight edge supporting frame and operative at any position with respect to the circumference of said knob to release said latching means.

4. In a drafting machine, the combination with a drafting head comprising means relatively fixed in orientation, a pivot pin, a straight edge supporting frame carried by the pivot pin, a handle carrying frame carried by the upper end of the pivot pin, means latching said straight edge supporting frame to said means relatively fixed in orientation, said pivot pin being formed with a longitudinally extending passage terminating at its lower end in register with the means latching

said straight edge supporting frame; a plurality of movable elements in the passage, laterally movable disc means carried by the handle carrying frame below the handle comprising a centrally located upwardly extending portion engageable with the upper end of an element movable in the passage to engage and rock said element and thereby propel said elements downwardly in the passage to actuate the latching means.

5. In a drafting machine, the combination with a drafting head comprising means relatively fixed in orientation, a pivot pin, a straight edge supporting frame carried by the pivot pin, a handle carrying frame carried by the upper end of the pivot pin, means latching said straight edge supporting frame to said means fixed in orientation, said pivot pin being formed with a longitudinally extending passage terminating at its lower end in register with the means latching said straight edge supporting frame; of a plunger formed with a disc-like head means to reciprocate the plunger in the passage, a camming member formed with a disc-like base resting on the said head, an actuating disc formed with centrally located means engageable with the upper end of the rod-like member to tip said member laterally to thereby depress the first-mentioned member and propel the elements in the passage.

6. In a drafting machine the combination with a drafting head comprising means relatively fixed in orientation, a pivot pin, a straight edge supporting frame carried by the pivot pin, a handle carrying frame carried by the upper end of the pivot pin, means latching said straight edge supporting frame to said means fixed in orientation, said pivot pin being formed with a longitudinally extending passage terminating at its lower end in register with the means latching said straight edge supporting frame; of an annular wall comprising the upper end of the pivot pin defining a recess, spring means in the recess, a rod-like element in the recess urged upwardly by the spring means, said element being formed with a head, an element formed with a base resting on the head, a disc, means to support the disc in universal movement in a horizontal plane, and means offset with respect to the plane of the disc to engage the upper end of the element and displace the same whereby said rod-like element is depressed and the latching means actuated.

7. In a drafting machine, the combination with a drafting head comprising means relatively fixed in orientation, a pivot pin, a straight edge supporting frame carried by the pivot pin, a handle carrying frame carried by the upper end of the pivot pin, means latching said straight edge supporting frame to said means fixed in orientation, said pivot pin being formed with a longitudinally extending passage terminating at its lower end in register with the means latching said straight edge supporting frame; of a plurality of elements in the passage comprising a plunger in the upper portion of the passage and extending therewithout, said plunger being formed with a plate, a member formed with a plate supported on said plunger plate, means carried by the pivot pin limiting upward movement of the plates, spring means urging the plunger upwardly and a relatively flat disc-like member supported on the handle carrying frame and comprising a portion engaging the upper plunger to move the same angularly and thereby depress the lower plunger to propel the elements and thereby actuate the latch.

8. In a drafting machine, the combination with

a drafting head comprising means relatively fixed in orientation, a pivot pin, a straight edge supporting frame carried by a lower end of the pivot pin, a handle carrying frame carried by the upper end of the pivot pin, means latching said straight edge supporting frame to said means fixed in orientation, said pivot pin formed with a longitudinally extending passage comprising an upper passage portion of enlarged diameter and terminating at its lower end in register with the means latching said straight edge supporting frame; of a plurality of elements in the passage comprising a plunger in the upper portion of the passage and extending thereabove, said plunger being formed with a plate on its upper end, a member formed with a plate on its lower end and thereby supported on the first-named plate, said last-named member being formed with knob means, a relatively flat disc-like member supported on the handle carrying frame for reciprocation in a horizontal plane and formed centrally with a cylindrical passage receiving the knob means.

9. In a drafting machine, the combination with a drafting head comprising means relatively fixed in orientation, a pivot pin, a straight edge supporting frame carried by the pivot pin, a frame carried by the upper end of the pivot pin, means latching said straight edge supporting frame to said means fixed in orientation, said pivot pin being formed with a longitudinally extending passage terminating at its lower end in register with the means latching said straight edge supporting frame; of a plurality of elements in the passage comprising a plunger in the upper portion of the passage and extending therewithout, said plunger being formed with a head, an upper member formed with a base supported on said plunger head, means carried by said pivot pin limiting upward movement of the said upper member, elastic means supporting said plunger and cooperating with said plunger head and with said pivot pin, and a member supported for lateral movement in any horizontal direction on the frame comprising a portion engaging the upper end of the upper member to cant the upper member and thereby depress the plunger.

10. In a drafting machine, the combination with a drafting head comprising means relatively fixed in orientation, a pivot pin, a straight-edge supporting frame carried by the pivot pin, a handle-carrying frame carried by the upper end of the pivot pin, means latching said straight edge supporting frame to said means fixed in orientation, said pivot pin being formed with a longitudinally extending passage terminating at its lower end in register with the means latching said straight-edge supporting frame; of a

plurality of elements slidably arranged in the said passage and comprising a plunger in the upper portion of the passage and extending therewithout, said plunger being formed at its upper end with a head, a camming member formed at its lower end with a base supported on the said plunger head on the upper end of said plunger, means carried by said pivot pin and cooperating with said base and limiting upward movement of said plunger and camming member, spring means cooperating with said pivot pin and said plunger head exerting upward pressure on the plunger head, and a manually operable member supported for lateral sliding movement in any horizontal direction on the handle-carrying frame and having a portion engaging the upper end of said camming member to rock the same angularly on its plate base when said manually operable member is slid laterally in any direction, thereby depressing said plunger and moving the elements in said passage and moving to unlatching position the means latching said straight-edge supporting frame.

11. In a drafting machine, the combination with a drafting head comprising means relatively fixed in orientation, a pivot pin, a straight edge supporting frame carried by the pivot pin, a frame carried by the supper end of the pivot pin, means latching said straight edge supporting frame to said means fixed in orientation, said pivot pin being formed with a longitudinally extending passage terminating at its lower end in register with the means latching said straight edge supporting frame; of a member movable laterally by pressure at any point on its periphery unlatching and releasing said straight edge supporting frame to permit angular movement thereof.

LEENDERT KETTING.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
826,971	Stowell	July 24, 1906
2,168,940	Little	Aug. 18, 1939
2,226,882	Wallace	Dec. 31, 1940
2,236,656	Wallace	Apr. 1, 1941
2,347,625	Weidemann	Apr. 25, 1944
2,243,731	Eubanks	May 27, 1941
2,370,971	Ketting	May 6, 1945
2,377,429	Ketting	June 5, 1945

FOREIGN PATENTS

Number	Country	Date
484,526	Germany	Oct. 17, 1929