Sept. 16, 1941. H. WIEDEMANN 2,256,445

DRAFTING MACHINE

Filed Nov. 2, 1939

FIG. 3.

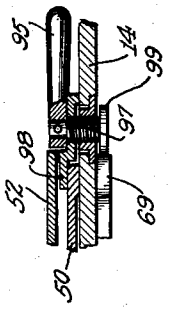


FIG. 4.

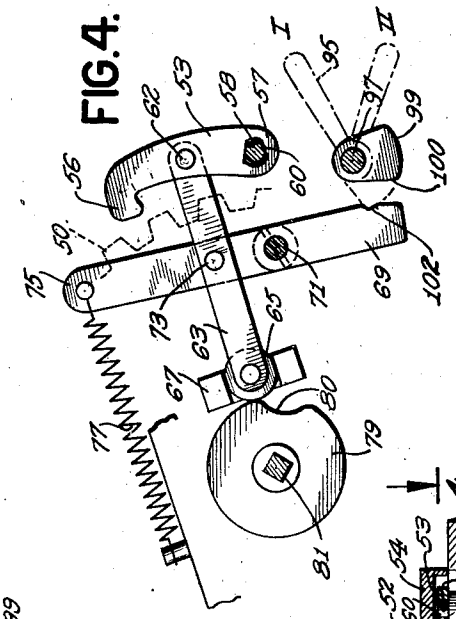


FIG. 2.

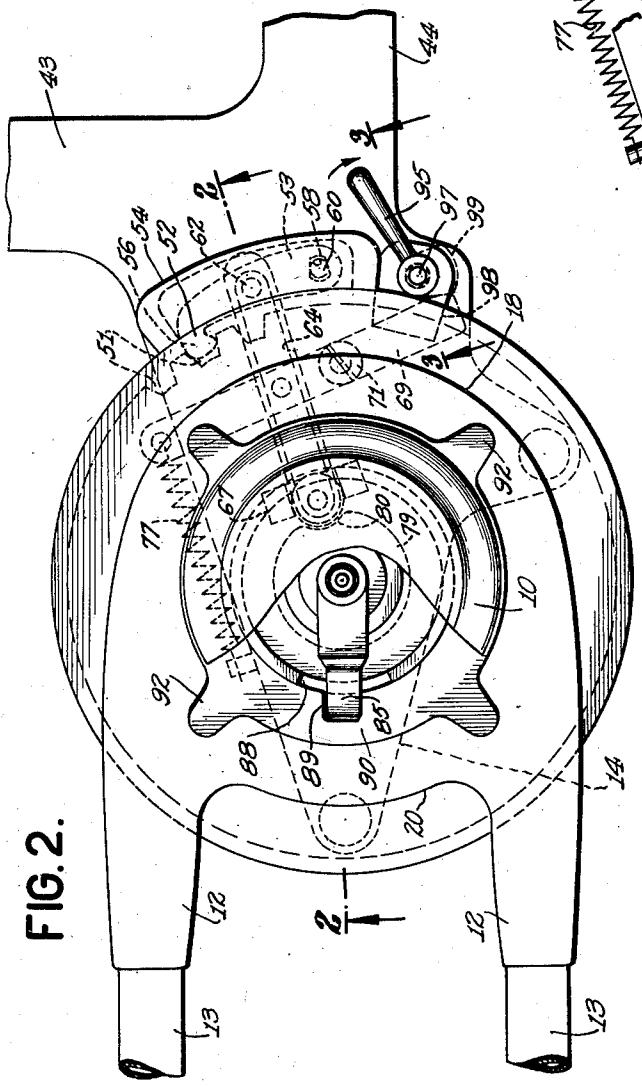
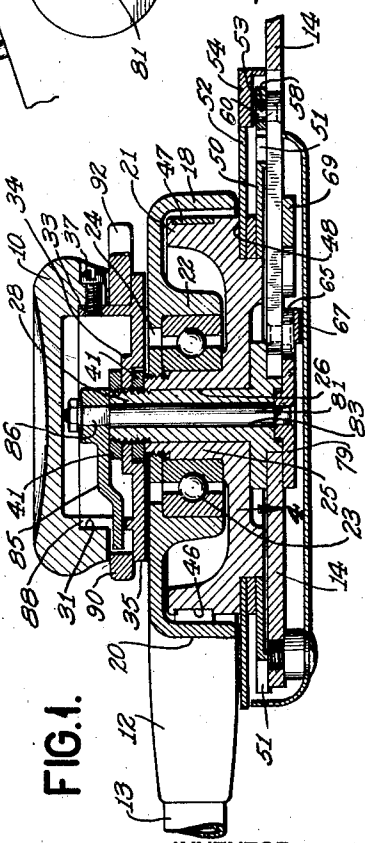


FIG. 1.



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DRAFTING MACHINE

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16 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 secured 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 stopped 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 protractor 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 protractor 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 which is utilized to return the wheel.

The invention further seeks to lock the protractor at any angle or to retain the protractor released for movement at will. To this end, supplemental locking devices are provided having three positions, one a position in which the protractor is free for control by the wheel controlled latching device, a second in which the wheel controlled latching device is retained in inoperative position and a third position in which the protractor is clamped or otherwise held at any position selected by the draftsman.

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 drawing illustrating one embodiment by which the invention may be realized, and in which:

Figure 1 is a view showing the head of the drafting device of this invention in vertical section;

Figure 2 is a view, looking from above, and illustrating the drafting head of Figure 1, parts being broken away to show details of construction;

Figure 3 is a view showing a clamping device by which the protractor may be secured at any intermediate position; and

Figure 4 is a detail view of the latch actuating mechanism.

Referring first to Figure 1, it will be noted that a knob 10 is turnable relative to the end of the arm 12 to adjust the position of straight edges (not shown) carried on the frame member 14 with respect to the arm 12. The arm 12 is illustrated as consisting generally of a pair of spaced tubular connecting members 13 through which the flexible belt 47 passes, as will be understood. The member 12 is formed with a semi-cylindrical outer wall 18 and an inner flange 20 defining a space to receive a pulley 21. Obviously the arms may assume any convenient structural shape.

The arm end 12 is provided, substantially concentric with the end wall 18, with a downwardly extending cylindrical boss or flange 22 and an axial aperture or bore 24 therewithin. Within this wall 22 is mounted an anti-friction device 23 in which turns the journal 25 of the pulley 21. In a wheel and band type drafting machine the pulley is relatively fixed in orientation. The journal 25 is formed with a bore 26 for the pivot pin 28 which is connected at its upper end to the hand knob 10 and at its lower end is secured

to the frame member 14 supporting the straight edges (not shown).

The knob 10 is recessed, as at 31, and receives a frame comprised of the peripheral annular wall 33 and bottom wall 35. The wall 33 is formed with a threaded aperture receiving a screw 37 by which the knob 10 and frame 33, 35 are united. The bottom wall 35 is upwardly offset centrally as at 34 to afford space for the lower nut 41 and is apertured to receive the pivot pin 28, the former being clamped to the latter by the nuts 41. Thus, when the knob 10 is turned, the pivot pin 28 turns with it and turns the straight edge frame 14.

The straight edge frame member 14 lies in parallel relationship to the bottom of the pulley 21 with respect to which it is capable of turning and is, conveniently although not necessarily, in substantially the shape of a triangular plate, as shown in Figure 2, having an arm 43 extending in one direction and an arm 44 extending in a direction generally perpendicular thereto, the arms 43 and 44 being adapted to removably receive the straight edges, as will be understood. The frame 14 thus turns with the knob 10 and also is able to turn with respect to the pulley 21 of fixed orientation. Latch means are provided to lock the straight edge frame 14 and pulley 21 together for maintaining the proper relationship with the lines on the drawing.

The pulley 21 is provided with a groove 46 for the endless belt 47 and is rabbeted in its lower peripheral edge as at 48. Disposed within the rabbeted portion 48 and fixed to the pulley 21 is an annular plate 50 formed in its periphery at predetermined intervals with locking recesses 51 (Figure 2) said recesses 51 bearing a definite relation to the graduations on the protractor 52 also fixed to the pulley whereby, in conjunction with cooperating locking devices 51, 53 about to be described, the straight edges may be fixed with respect to the protractor 52 at predetermined successive intervals, such as every fifteen degrees, with respect to an index as determined, say, on a vernier plate 54 carried with the frame 14. As a matter of fact, the position of the protractor 52 is more or less determined by the position of the pulley 21 and the band 47. The frame 14 which carries the straight edges is movable relative to the protractor as well as the pulley to which the protractor 52 and plate 50 are attached and the angular position of the straight edges with respect to lines on the drawing is determined by the engagement of the cooperating locking device or latch 53 (Figure 4) in a predetermined recess 51. It is contemplated that this cooperating locking device shall, in some circumstances, automatically snap into a recess 51 and thus permit a ready location of the straight edges through predetermined angles, such as angles of 15° or multiples thereof. Thus, the straight edge carrying frame 14 may be said to be relatively fixed with respect to the latching plate 50.

The cooperating latching member is shown in greater detail in Figures 2 and 4 as an angularly shaped lever 53 formed with a detent 56 at its one end which is shaped as to enter into and position itself in one of the recesses 51. The other extremity 57 of the arm 53 is formed with an aperture 58 for reception on a pin 60 mounted on the triangular plate 14. The lever 53 is urged toward the latching plate 50 by the engagement of a pin 62 carried by the end of a link 63 slidable in a slot or groove 64 formed in the frame 14 and provided at the end remote from the latch 53 with a roller 65 positioned by, say, a frame 67. Beneath the link or slide 63 is a lever 69 pivoted as at 71 to the frame 14 and secured as by pin 73 to the slide 63. The free end 75 of this lever 69 is urged toward the axis of the pulley 21, as by a spring 77, whereby the normal tendency of the lever 69 is to move the slide 63 inwardly to draw the latching lever 53 into engagement with the latching disc 50.

The roller 65 beneath the inner end of slide 63 is adapted to be engaged by a cam 79 carried on the lower end of the shaft means shown as a pin 81 freely rotatable within a bore 83 in the pivot 28. The cam 79 is circular but has a low spot 80 and it will be understood that when the low spot 80 is in register with the roller 65, the spring 77 is permitted to draw the slide 63 toward pin 81 to bring the latch 53 in engagement with the latching plate 50. The lever is forced out of engagement with the latching plate 50 when the dwell of the cam 79 moves the slide outwardly.

In order to turn the pin 81, an arm 85 is fastened to the squared upper end 86 thereof, which arm extends through a cut-away portion 88 of the wall 33 of the frame 33, 35 and fits into a recess 89 in what may be termed a star wheel 90 having, conveniently, a plurality of spaced spokes 92 which may be engaged by a thumb or finger of the hand engaging the knob 10 and be rotated to rotate the pin 81 and thereby causing the cam 79 to advance the slide 63 against the action of the power storing means 77. The slot 88 is of a predetermined width and is so positioned relative to the pin 81 that the cam 79 has a predetermined limited movement so that the roller 65 never rides completely on to the dwell as shown in Figure 4. By this disposition of parts, so soon as the hand wheel 90 is released, the tendency of the roller 65, under the influence of the spring 77, is to roll down into the low spot 80, thereby causing the cam 79 to turn and return the wheel 90 to initial position. Obviously, the cam 79 will actuate the latch 58 in either direction of rotation of the cam. When the star wheel 92 is released, the power storing means 77 will return the latch into latching engagement with the latching plate 59.

In order to hold the straight edge at points intermediate the registering positions of the notches 51, a clamping lever 95 is provided which, since it is relatively rarely used, is carried, in the illustrated embodiment, at a low point as on the frame 14. This lever is secured to a threaded member or shaft 97 located in the frame 14 and carries a clamping member 98 adapted to engage the plate 50 when the handle 95 is turned to clamp the parts together. At the lower end of shaft 97 is fixed a cam 99 in the plane of lever 69. This cam is so shaped that it is out of contact with lever 69 when the handle 95 is in the dot and dash line position indicated by the Roman numeral I of Figure 4. When the handle 95 is turned to the position indicated by the Roman numeral II, the cam 99 engages the lever arm 69 to rotate the lever about its pivot 71 and move and hold the latch 53 out of engagement with the notched plate 50 whereby the straight edges may be freely turned. Conveniently, in this position a corner 100 of the cam 99 enters a notch 102 in the lever arm to prevent accidental displacement. Further movement of handle 95 in a clockwise direction, as viewed in Figure 4, causes the screw 97 to travel downwardly in its

bearing, as viewed in Figure 3, to bring the clamping member 98 into clamping engagement with the plate.

The operation of the device is apparent from the foregoing description. Suffice it to say that, for the first time, a draftsman may release the straight edges for turning by the knob without removing his hand from its accustomed position on the knob and by any finger or thumb of that hand which he finds most convenient.

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 drawing, except as indicated in the appended claims.

What is claimed is:

1. In a drafting machine head, in combination, a relatively fixed latching plate, a pivot pin supported in the head, a straight edge supporting frame carried by the pivot pin, a knob for manual engagement carried by the pivot pin, a latch lever pivotally carried with the frame and coacting with the latching plate, a shaft rotatably carried longitudinally by the pivot pin, a cam on the shaft, a slide operatively connected with the latching lever, a roller on the slide for engagement by the cam, power storing means to move the roller against the cam, an arm on the shaft and a star wheel rotatable on the knob and operatively connected with the arm.

2. In a drafting machine head, in combination, a relatively fixed latching plate, a pivot pin rotatably supported in the head, a straight edge supporting frame carried by the pivot pin, a knob for manual engagement carried by the pivot pin, a latch lever pivotally carried with the frame and coacting with the latching plate, a shaft rotatably carried longitudinally of the pivot pin, a cam carried by the lower end of the shaft, a slide operatively connected with the latching lever and engaged by the cam, tension means urging the slide into engagement with the cam, an arm on the other end of the shaft, a star wheel rotatably mounted on the knob and means operatively connecting the star wheel with the last named arm.

3. In a drafting machine head, in combination, means relatively fixed in orientation, straight edge supporting means relatively movable with respect to the relatively fixed means, a latching plate carried with one of said means, a latch carried with the other of said means and coacting with the latching plate, a pivoted arm to actuate the latch, a screw shaft threaded into the supporting means, a clamping member carried thereby and movable, upon rotation of the shaft, into clamping engagement with the latching plate and a cam carried by the shaft and movable upon initial rotation of the shaft into engagement with the arm to retain the latch in inoperative position.

4. In a drafting machine head, in combination, means relatively fixed in orientation, a straight edge supporting means rotatably mounted on the head, a hand knob to rotate the straight edge supporting means, a latching plate carried by one of said means, a latch lever pivotally carried by the other of said means and coacting with the plate, a reciprocating member operatively connected with the latch lever, a manually actuatable means carried by the knob extending beyond the horizontal circumference of the knob and movable along said circumference and operative connections between the circumferentially movable member and the reciprocating member converting the circumferential movement of the circumferentially movable member into a movement of translation of the reciprocating member whereby the latch is actuated.

5. In a drafting machine head, in combination, means relatively fixed in orientation, straight edge supporting means rotatably mounted on the head, a hand knob to rotate the straight edge supporting means, a latching plate carried by one of said means, a latch lever pivotally carried by the other of said means and coacting with the plate, power storing means to urge the latching lever into coacting relationship with the plate, a reciprocating member operatively connected with the latch lever, a manually actuatable means carried by the knob extending beyond the horizontal circumference of the knob and movable along said circumference and operative connections between the circumferentially movable member and the reciprocating member converting the circumferential movement of the circumferentially movable member into a movement of translation of the reciprocating member whereby the latch is actuated.

6. In a drafting machine head, in combination, means relatively fixed in orientation, straight edge supporting means relatively movable with respect to the relatively fixed means, a latching plate carried by one means, a latch carried by the other means and coacting with the latching plate, a pivoted arm, a slide operatively connected to the pivoted arm and to the latch, means to reciprocate the slide to actuate the latch and a cam rotatable into engagement with the arm to retain the latch in inoperative position.

7. In a drafting machine head, in combination, means relatively fixed in orientation, straight edge supporting means relatively movable with respect to the relatively fixed means, a latching plate carried by one of said means, a latch carried by the other of said means and coacting with the latching plate, a pivoted arm formed with a notch, a slide operatively connected to the pivoted arm and to the latch, means to reciprocate the slide to actuate the latch and a cam having a portion movable into engagement with the notch in the arm to retain the latch in inoperative position.

8. In a drafting machine head, in combination, means relatively fixed in orientation, a straight edge supporting means rotatably mounted on the head, a hand knob to rotate the supporting means, a latching plate carried by one of said means, a latch lever pivotally carried by the other of said means and coacting with the plate, power storing means to urge the latching lever into coacting relationship with the plate, a reciprocable member operatively connected with the latch lever, a manually actuatable circumferentially movable member on the knob and cam means rotated by the circumferentially movable member and engaging and reciprocating the reciprocable member whereby the latch is actuated.

9. In a drafting machine head, in combination, means relatively fixed in orientation, straight edge supporting means relatively movable with respect to the relatively fixed means, a latching plate carried by one of said means, latching means carried by the other of said means and coacting with the latching plate, a first cam means operatively connected with the latching means,

means carried by the knob to actuate the first cam means and a second cam means movable to move and retain the latching means in inoperative position.

10. In a drafting machine head, in combination, means relatively fixed in orientation, straight edge supporting means relatively movable with respect to the first named means, a latching plate carried by one of said means, a knob to move the supporting means, latching means carried by the other of said means and coacting with the latching plate, means accessible on the knob and operative connections between said means and the latching means to actuate the latching means and cam means independently movable to move the latching means to inoperative position.

11. In a drafting machine head, in combination, means relatively fixed in orientation, straight edge supporting means, a knob for manual engagement to rotate the said supporting means with respect to the relatively fixed means, a latching plate carried by one of said means, a latch carried by the other of said means and coacting with the latching plate, means circumferentially spaced along and extending outwardly from the horizontal periphery of the knob, means to support said last named means with provision for movement circumferentially of the knob and operative connections between the said circumferentially spaced means and the latch whereby the latch is actuated by circumferential movement of the spaced means.

12. In a drafting machine head, in combination, a member relatively fixed in orientation, a straight edge supporting frame rotatably mounted on the head, means to latch the said frame to said relatively fixed member, a knob to rotate said frame and means carried by the knob extending beyond the horizontal circumference of the knob and movable along said circumference operative at any position on the circumference of said knob to release said latching means.

13. In a drafting machine head, in combination, a member relatively fixed in orientation, a straight edge supporting frame rotatably mounted on the head, means to latch said frame to said relatively fixed member, a knob to rotate said frame, means extending circumferentially of said knob and movable in either direction circumferentially of the knob, operative connections between the circumferentially extending means and the latch means to release said latch means upon circumferential movement of the circumferentially extending means in either direction.

14. In a drafting machine head, in combination, a member relatively fixed in orientation, a straight edge supporting frame mounted for rotation with reference to said relatively fixed member, a hand knob fixed to said frame, an annular member concentric with and surrounding the horizontal periphery of said knob, means to latch said frame to said relatively fixed member controlled by said annular member.

15. A protractor head comprising a pulley, a protractor and a notched plate fixed to said pulley, a tubular pivot pin journalled in said pulley, a straight edge supporting frame fixed to said pivot pin, a lever pivoted on said frame having a detent to engage in a notch of said notched plate, a reciprocable link carried by said frame one end of which is attached to said detent lever, a second lever pivoted on said frame, and jointed to said link, a spring coacting with said second lever to cause the detent to enter a notch in the notched plate, a pin within said tubular pivot pin, a cam on one end of said pin cooperating with said reciprocable link to disengage said detent, a knob fixed to said tubular pivot pin for rotating said frame, an annular member encircling said knob, and a lever between said pin and the annular member whereby angular movement of the annular member will release the frame for rotary movement, and an index on the frame associated with the protractor to indicate the extent of rotation of the frame.

16. A protractor head comprising a pulley, a protractor and a notched plate fixed to said pulley, a tubular pivot pin journalled in said pulley, a straight edge supporting frame fixed to said pivot pin, a lever pivoted on said frame having a detent to engage in a notch of said notched plate, a reciprocable link carried by said frame one end of which is attached to said detent lever, a second lever pivoted on said frame, and jointed to said link, a spring coacting with said second lever to cause the detent to enter a notch in the notched plate, a pin within said tubular pivot pin, a cam on one end of said pin cooperating with said reciprocable link to disengage said detent, a second cam to engage said second lever to retain the detent out of contact with the notched plate, a knob fixed to the end of said tubular pivot pin for rotating said frame, an annular member encircling said knob and a lever between said pin and the annular member whereby angular movement of the annular member will release the frame for rotary movement and an index on the frame associated with the protractor to indicate the extent of rotation of the frame.

HANS WIEDEMANN.

DISCLAIMER

2,256,445.—*Hans Wiedemann*, West New York, N. J. DRAFTING MACHINE. Patent dated September 16, 1941. Disclaimer filed September 14, 1944, by the assignee, *Keuffel & Esser Company*, and the inventor.

Hereby enter this disclaimer to claims 4 and 5 in said specification.

[*Official Gazette October 10, 1944.*]