Sept. 13, 1932. F. KUHLMANN 1,877,340

DRAFTING MACHINE

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Fig. 1

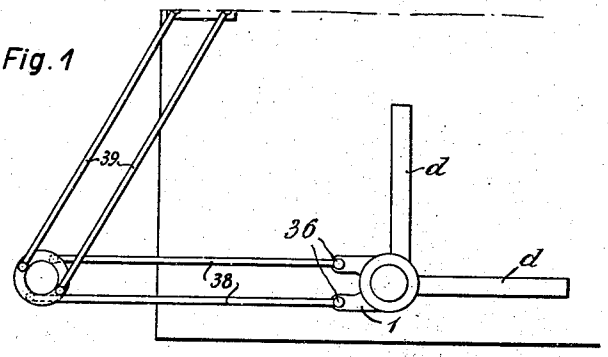


Fig. 2

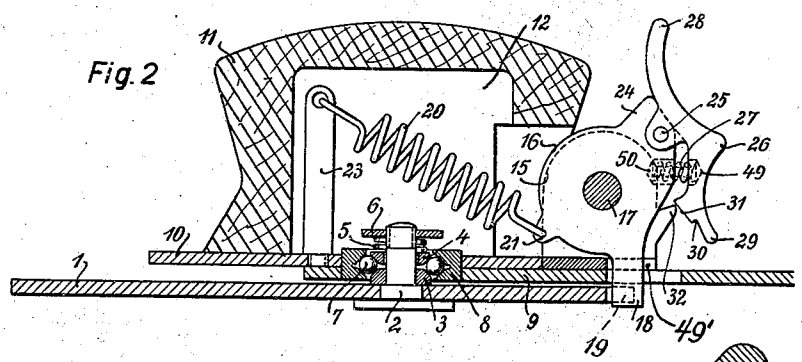


Fig. 2a

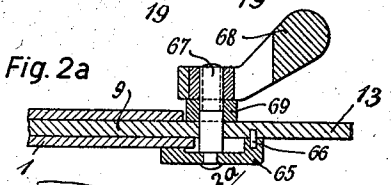
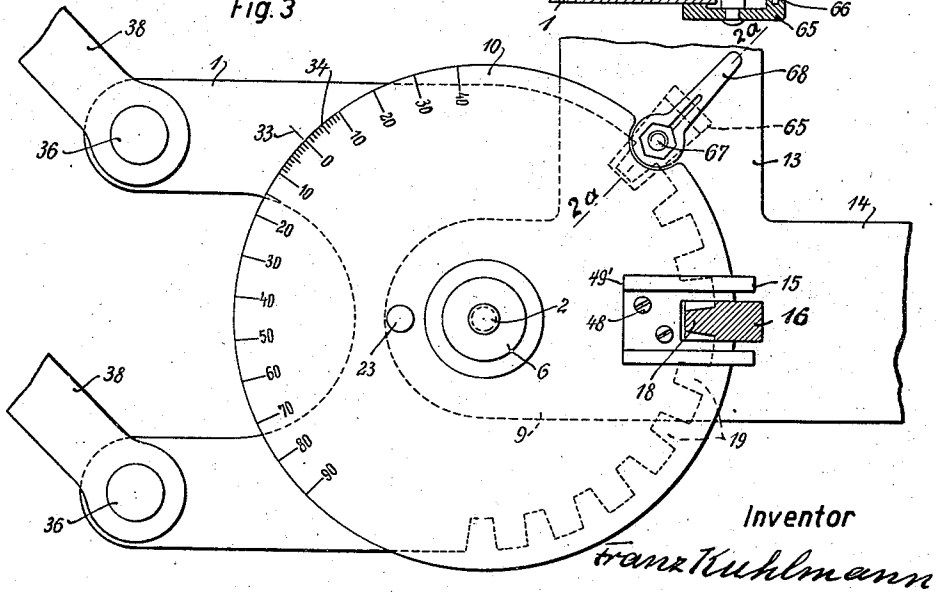


Fig. 3



Inventor

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Fig. 4

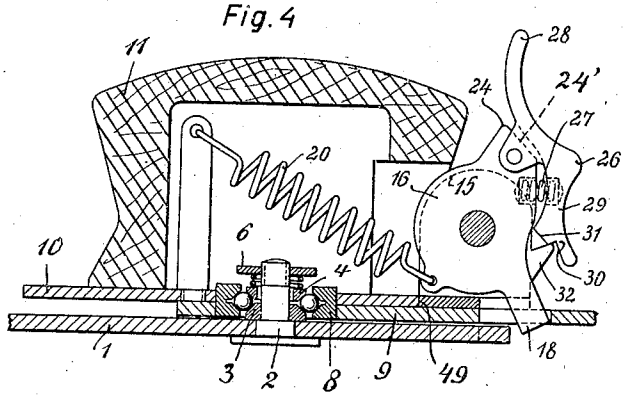


Fig. 5

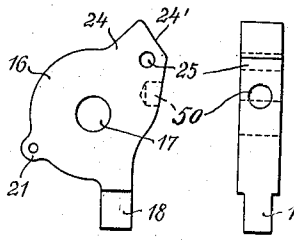


Fig. 6

Fig. 7

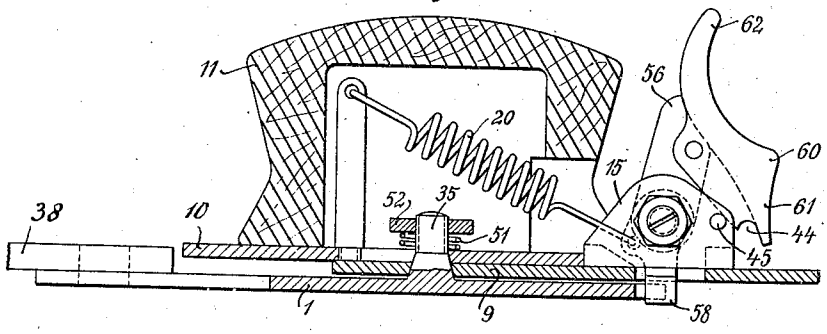
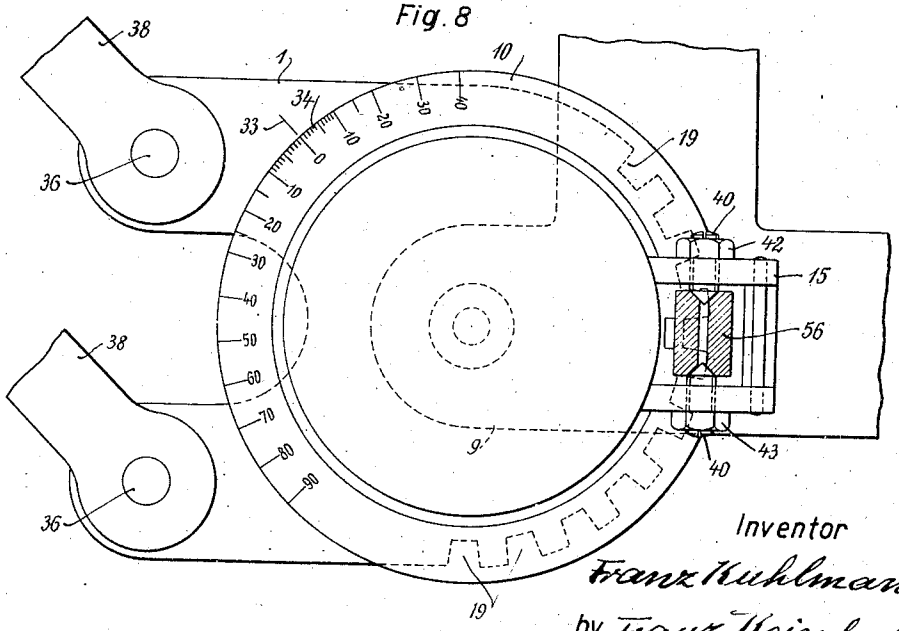


Fig. 8



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Patented Sept. 13, 1932

1,877,340

UNITED STATES PATENT OFFICE

FRANZ KUHLMANN, OF RUSTRINGEN, GERMANY

DRAFTING MACHINE

Application filed May 2, 1930, Serial No. 449,203, and in Germany May 7, 1929.

My invention relates to improvements in drafting machines comprising a head adapted to be moved across the surface of a drawing board and carrying a drafting instrument such as a protractor provided with one or two rulers, the said head being mounted on a carrier comprising, for example, two pairs of arm-members pivotally united and each having the form of a parallelogram. In machines of this class the drafting instrument is mounted on a plate connected with the outer end of one pair of arms so that it may be turned about a perpendicular axis into different angular positions, and means are provided for positively locking the drafting instrument in definite angular positions, and in addition means are provided for locking the drafting instrument in any angular position. My invention relates more particularly to the means for positively locking the drafting instrument, and the object of the improvements is to provide locking mechanism comprising a single lever adapted, first, temporarily to set said locking means in non-locking position and, second, to set the same in non-locking position and to lock the same in the said non-locking position. The positive locking mechanism comprises a locking member mounted on the rotatable drafting instrument and adapted for engagement with notches formed on the plate or other support connected with the said arm-members, and in my improved machine the said locking member has a two-armed lever rockingly mounted thereon, which is adapted when pressing on one arm thereof to be coupled with said locking member and temporarily to disengage the same from the said notches, and when pressing on the other arm thereof to retract the locking member from said notches and to lock the same in non-locking position.

Another object of the improvements is to provide a locking member which can be accurately adjusted relatively to the notches of the plate for adjusting the angular position of the drafting instrument, and with this object in view my invention consists in mounting the locking member between a pair of pointed pivot screws adapted to adjust the locking member circumferentially of the head.

Finally an object of the improvements is to provide a drafting machine in which the drafting instrument is accurately centred, and with this object in view my invention consists in mounting the drafting instrument on its support through the intermediary of an anti-friction bearing having one of its raceways formed on two conical rings pressed together by a spring, so that any wear of the raceways is automatically compensated.

For the purpose of explaining the invention several examples embodying the same have been shown in the accompanying drawings in which the same reference characters have been used in all the views to indicate corresponding parts.

In said drawings

Fig. 1 is a plan view showing the drafting machine as applied to a drawing board,

Fig. 2 is a sectional elevation on an enlarged scale showing the drafting instrument.

Fig. 2*a* is a sectional elevation taken on the line 2*a*—2*a* of Fig. 3,

Fig. 3 is a top plan view of Fig. 2 partly in section,

Fig. 4 is a sectional elevation similar to the one illustrated in Fig. 2 and showing the locking member in non-locking position,

Fig. 5 is a detail view showing the locking member,

Fig. 6 is an elevation as seen from the right in Fig. 5,

Fig. 7 is a sectional elevation similar to the one illustrated in Fig. 2 showing a modification, and

Fig. 8 is a top plan view of Fig. 7.

In Fig. 1 I have shown a drafting machine comprising two pairs of arm-members 38 and 39 pivotally united and each having the form of a parallelogram. But I wish it to be understood that my invention is not limited to the form of the drafting machine shown herein. The outer ends of the arm-members 38 are jointed at 36 to a plate 1 having a central post 2 fixed therein. On the said post two cones 3 and 4 are axially shiftable,

which provide the inner raceway of an anti-friction bearing, and which are forced towards each other by a coiled spring 5 placed between the upper cone 4 and a disk 6 threaded on the post 2. The outer raceway of the said bearing is in the form of a ring 8 formed internally with an annular groove receiving the balls 7 of the bearing. The ring 8 is a forced fit in concentric bores of disks 9 and 10 thus rigidly connecting the said disks. The disk 9 is formed with perpendicular arms 13 and 14 having rulers *d* fixed thereto, and the disk 10 is provided with scale marks 34 cooperating with a mark 33 made on the plate 1, the said parts providing a protractor as is known in the art. To the disk 10 a knob 11 is fixed, which is formed with a cavity 12.

The plate 1 is formed circumferentially with notches 19 cooperating with a locking member 16 mounted on a shaft 17 carried by a bracket 15 comprising two upwardly directed arms fixed to the disk 9 by a pair of screws 48, the disk 10 being formed with a recess 49′ accommodating the bracket 15. The locking member 16 is formed with a downwardly directed arm 18 adapted for engagement with the notches 19, a spring 20 fixed to an eye 21 of the locking member 16 and to an upright 23 rising from the disk 10 tending to hold the arm 18 in engagement with the notches 19. To a part 24 of the locking member 16 a pivot bolt 25 is fixed and on the said pivot bolt a lever 26 is rockingly mounted which is formed with an upper arm 28 and a lower arm 29 both shaped according to the form of the thumb, a spring 27 being embedded in sockets 49 and 50 of the lever 26 and the locking member 16 for forcing the lever 26 with its lower arm outwardly. The upper arm is adapted to engage a shoulder 24′ of the part 24, and the lower arm 29 is formed with a cam face 31 and a shoulder 30 cooperating with a nose 32 formed on one of the arms of the bracket 15.

The device for clamping the rulers in any angular position comprises a clamping plate 65 bearing on the bottom faces of the plate 1 and the arm 13 and held in position by means of a pin 66. To the plate 65 is fixed a pin 67 passed upwardly through a hole made in the arm 13 and having a wing nut 68 screwed to its top end, a washer 69 being interposed between the said nut and the arm 13. Thus by turning the wing nut 68 the plate 65 may be thrown into and out of clamping engagement with the plate 1 and the arm 13.

Normally the disk 9 and the rulers carried thereby are held in a certain angular position relatively to the plate 1 by the locking member 16 engaging in one of the notches 19, and if it is desired to set the rulers in another angular position the draftsman grips the knob 11 with his left hand and presses the upper arm of the lever 28 with the thumb inwardly and into engagement with the shoulder 24′, thus retracting the arm 18 out of the notch 19 engaged thereby, and he turns the knob 11 and the disks 9 and 10 into the desired position, whereupon he releases the lever 26 permitting the member 16 to be rocked by the spring 20 with the arm 18 into the notch 19 corresponding to the desired position. Thus the rulers can be set at definite angles of 0°, 15°, 30° etc. If it is desired to set the rulers at intermediate angles, say 37° or 60½°, the draftsman presses with his thumb on the downwardly directed arm 29. Now the cam face 31 rides on the nose 32 so that the locking member 16 is rocked and the arm 18 is retracted from the notch 19. Finally the shoulder 30 engages the nose 32, whereupon the lever 26 is arrested and the arm 16 is held in non-locking position. Now the draftsman can set the rulers in any angular position by turning the knob 11, whereupon the disks 9 and 10 are fixed in position by means of the clamping device 65. If it is desired to set the rulers into another position having a notch 19 corresponding thereto, the clamping device is first released. The draftsman grips the knob 11 and engages the upwardly directed arm 28 with his thumb thus retracting the shoulder 30 from the nose 32, whereupon the knob *n* is turned and locked in position in the manner described above.

In the modification shown in Figs. 7 and 8 the plate 1 is made integral with a conical post 35 having the disks 9 and 10 mounted thereon, the said disks being held together by a spring 51 and a nut 52 screwing on the top end of the post 35. The locking member 56 is in the form of a lever having a downwardly directed arm 58 adapted for engagement with the notches 19, and it is mounted between two pivot screws 40 screwing in the upwardly directed arms of the bracket 15 and fixed in position by means of nuts 42 and 43. By screwing the said screws inwardly and outwardly the position of the arm 56 relatively to the notches 19 may be adjusted for adjusting the rulers relatively to the scale marks 33, 34. On the lever 56 a lever 60 is rockingly mounted which is formed with two arms 61 and 62 adapted to be engaged by the thumb of the draftsman, and the downwardly directed arm 61 is provided with a rounded shoulder 44 adapted to engage a pin 45 fixed to the bracket 15. Otherwise the construction and operation is the same as has been described with reference to Figs. 1 to 6.

I claim:

1. A drafting machine, comprising a carrier adapted to be moved across the surface of the paper, a member rotatably mounted on said carrier and carrying a drafting instrument, means for locking said member relatively to said carrier comprising a locking member mounted on said rotatable member and adapted for locking engagement

with said carrier, a two-armed lever mounted on said locking member and adapted to be coupled therewith when acting on one of its arms to move the same into non-locking position and means on said lever operative when acting on the other arm thereof for moving and locking said locking member in non-locking position.

2. A drafting machine, comprising a carrier adapted to be moved across the surface of the paper, a member rotatably mounted on said carrier and carrying a drafting instrument, means for locking said member relatively to said carrier comprising a locking member mounted on said rotatable member and adapted for locking engagement with said carrier, a two-armed lever carried by said locking member and adapted to be coupled therewith when acting on one of its arms to move the same into non-locking position, said lever and locking member being provided with corresponding cam faces and shoulders adapted when acting on the other arm of said lever, first to set said locking member into non-locking position and thereafter to lock the same in non-locking position.

3. A drafting machine, comprising a carrier adapted to be moved across the surface of the paper, a member rotatably mounted on said carrier and carrying a drafting instrument, means for locking said member relatively to said carrier comprising a locking member mounted on said rotatable member and adapted for locking engagement with said carrier, a two-armed lever carried by said locking member and adapted to be coupled therewith when acting on one of its arms to move the same into non-locking position, and means on said lever operative when acting on the other arm thereof for moving and locking said locking member in non-locking position, said shoulders being located so that they are thrown out of engagement with each other when acting on the first-named arm of said lever.

4. A drafting machine, comprising a carrier adapted to be moved across the surface of the paper, a member rotatably mounted on said carrier and carrying a drafting instrument, means for locking said member relatively to said carrier comprising a locking member mounted on said rotatable member adapted for locking engagement with said carrier, a two-armed lever carried by said locking member and adapted to be coupled therewith when acting on one of its arms to move the same into non-locking position, and a bolt carried by said member, there being a cam face and undercut shoulder formed on said lever in position for cooperation with said bolt and adapted when acting on the other arm of said lever first to move said locking member out of locking position and thereafter to lock said locking member in non-locking position.

In testimony whereof I hereunto affix my signature. Signed at Bremen, Germany, April 15th, A. D. 1930.

FRANZ KUHLMANN.