May 27, 1941. F. G. EUBANKS 2,243,732

DRAFTING MACHINE BAND TIGHTENING DEVICE

Filed Nov. 22, 1940 2 Sheets-Sheet 1

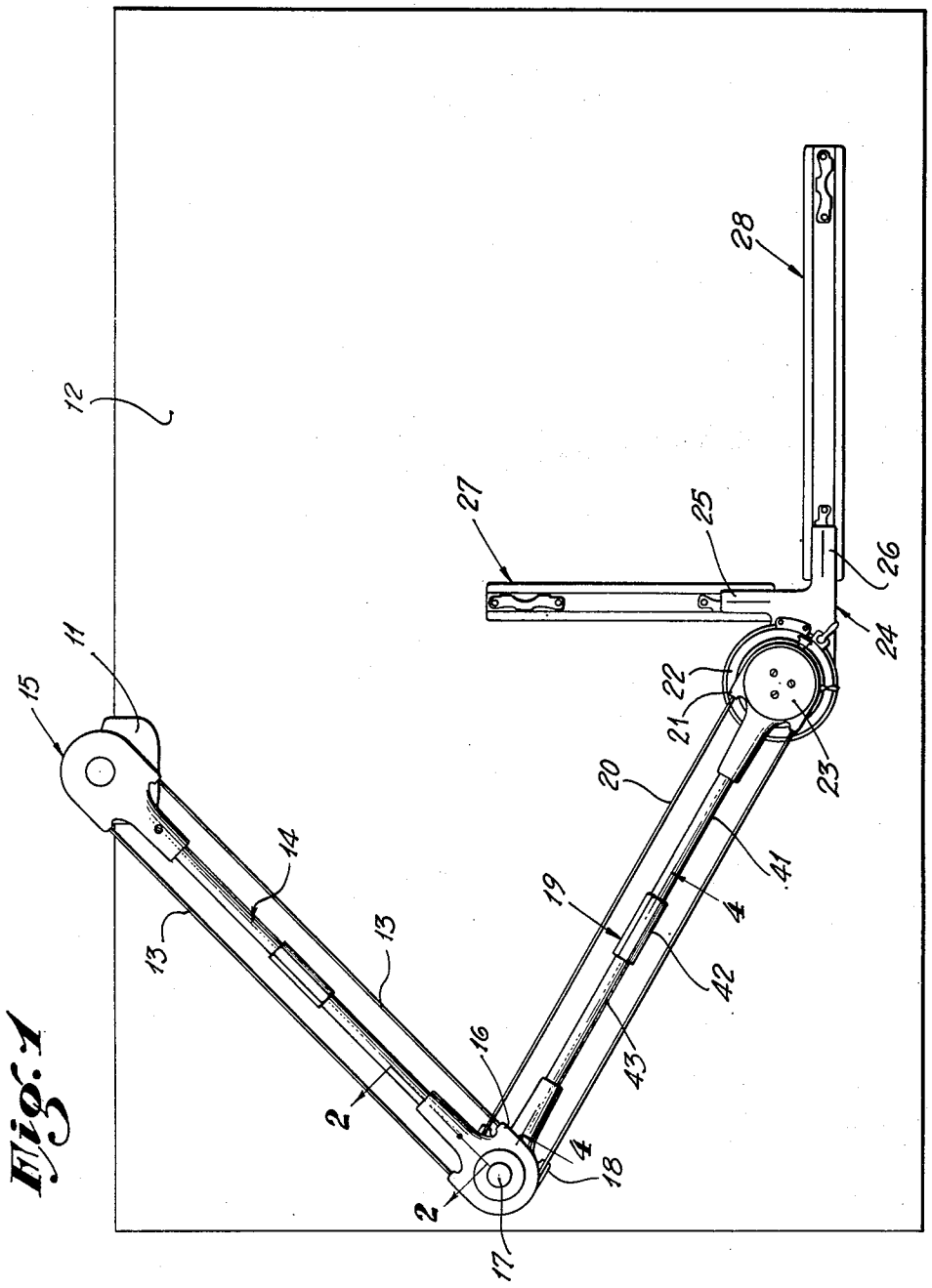


Fig. 1

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Filed Nov. 22, 1940 2 Sheets-Sheet 2

Fig. 2

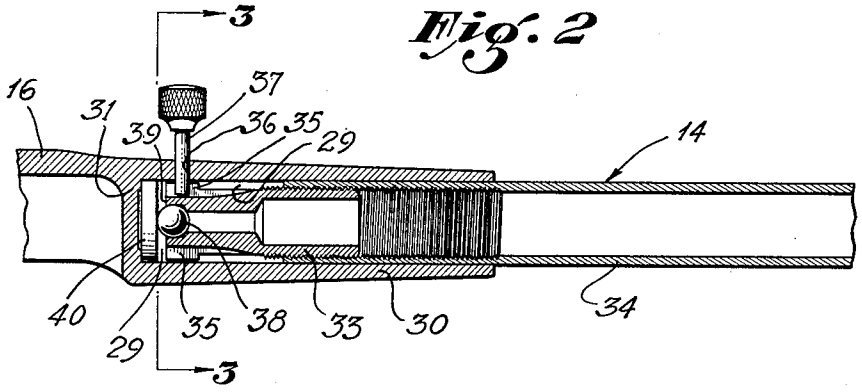


Fig. 3

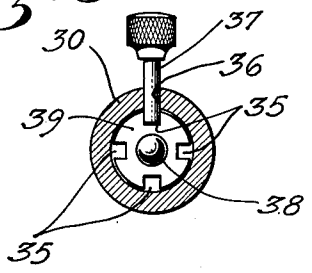
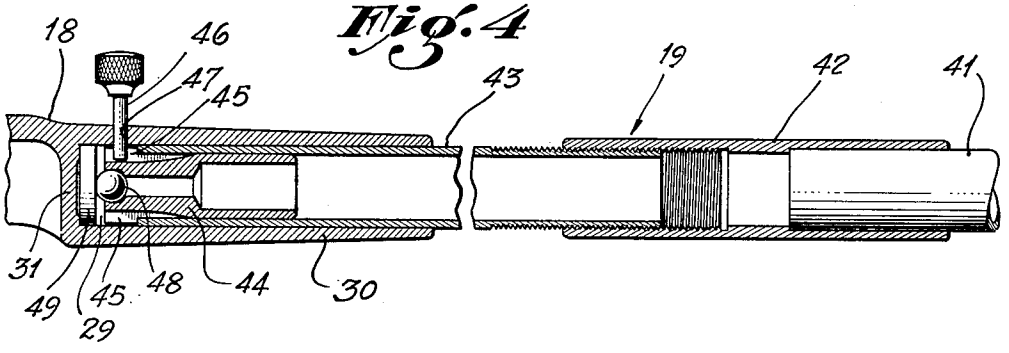


Fig. 4



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Patented May 27, 1941 2,243,732

UNITED STATES PATENT OFFICE

2,243,732

DRAFTING MACHINE BAND TIGHTENING DEVICE

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Application November 22, 1940, Serial No. 366,664

5 Claims. (Cl. 33—79)

My invention relates to a drafting machine comprising a fixed member clamped to a drawing board, an arm pivoted at one end of the fixed member, a second arm pivoted at one end to the moving end of the first arm, and a drafting head carried at the free end of the second arm and movable over the drawing board. The drafting head includes a protractor and a protractor arm provided with a vernier or witness point and with means for holding one or more rulers or straight edges which can be rotated about the protractor. As the drafting head is moved over the drawing board, orientation of the protractor is held constant by a combination of pulleys and bands.

The object of my invention is to provide, in a drafting machine of the band and pulley type, a flexible construction which permits the scales in the drafting head to lie flat upon the drafting board.

Another object of my invention is to provide, in a drafting machine of the band and pulley type, a flexible construction which permits the drafting head to be moved freely with respect to the board without increasing or decreasing the tension in the bands.

Another object of my invention is to provide, in a drafting machine of the band and pulley type, an arm for holding apart two of the heads of the drafting machine in order to maintain proper tension in the flexible band, which arm can be rotated with respect to said heads without affecting the length of said arm, but which, nevertheless, can be lengthened and shortened, as desired, by rotating one part of said arm with respect to another part of said arm.

Another object of my invention is to provide, in a drafting machine of the band and pulley type, an arm rotatable with respect to the head at either end, said arm comprising a tubular part and a part adjustable with respect to said tubular part, whereby the length of said arm can be changed as desired to adjust the tension in the band.

My invention has many other objects, advantages, and features, some of which, with the foregoing, will be apparent from the following description and accompanying drawings of the invention. It should be understood, however, that these particular embodiments of the invention are chosen for the purpose of exemplification, and I do not limit myself to the forms shown, since the invention, as set forth in the claims, may be embodied in a large plurality of forms.

Referring to the drawings:

Figure 1 is a plan view of the drafting machine of the pulley and band type embodying my invention.

Figure 2 is a sectional view taken along the line 2—2 in Figure 1 and showing the details of a preferred form of the band-tightening device.

Figure 3 is a view taken on the line 3—3 of Figure 2.

Figure 4 is a sectional view taken along the line 4—4 in Figure 1 and showing a modified form of my invention.

Referring to said drawings, the numeral 11 indicates any conventional clamp for holding the drafting machine to a drawing board 12. The clamp 11 carries a pivot shaft rising perpendicularly to the board, to which is rigidly affixed a single groove pulley (not shown) which is engaged by a band 13. An arm 14 is pivoted to the shaft by a suspension head 15 in such a manner that it can be rotated about said shaft. At the other end of the arm 14 is the upper elbow head 16 which articulates about axis 17 with the lower elbow head 18 which is connected to one end of the arm 19. A two-groove pulley (not shown) is mounted on the axis of articulation at 17 between the elbow heads 16 and 18. The band 13 engages one groove of this pulley and the band 20 engages the other groove. The other end of the arm 19 is connected to a head 21, which carries a grooved pulley (not shown), which is engaged by the band 20. The pulley carries the protractor 22. A shaft passing through the head 21 and the pulley (not shown) carries at its upper end the handle 23 and at its lower end the base plate 24. Said base plate is provided with scale chucks 25 and 26 carrying the scales 27 and 28.

The heads 16 and 18 each have a socket 29 defined by a cylindrical wall 30 and an end wall 31. For the purpose of holding the heads 15 and 16 apart in order to maintain proper tension in the flexible band 13, the arm 14 is made adjustable in length so that by increasing or decreasing the length of said arm 14 the distance between the heads 15 and 16 will be changed.

In the preferred form of my invention, I make the arm 14 adjustable by constructing it of two parts, namely, an adjustable part 33 which is threadedly connected to a tubular part 34. By causing relative rotation between the adjustable part 33 and the tubular part 34 of the arm, the length of the arm is changed.

The adjustable part 33 is preferably adapted to lie within the socket 29 in the head 16. A

portion of the tubular part 34 extends into the socket 29. Said portion is cylindrical and is adapted to make a sliding fit with the inner surface of the cylindrical walls 30 of said socket 29 in order that the arm 14 and the head 16 will be maintained in proper alignment and in order that the arm 14 will be rotatably supported in said socket.

As clearly shown in Figure 2, a substantial clearance is provided between the adjustable part 33 and the walls of said socket. In order that the adjustable part 33 may be prevented from rotating with the tubular part 34 when an adjustment of length of arm is to be made, a portion of the adjustable part 33 outside of the tubular part 34 is provided with one or more recesses 35, as shown in Figure 3, and an opening 36 is provided in the wall of the socket of the head 16. A pin 37, passed through the opening 36, engages one of the recesses 35. The pin 37 may be provided with a knurled head. A hardened steel ball 38 may be provided in a socket at the end 39 of the adjustable part 33 and bear against a hardened steel thrust disk 40 which contacts the end wall 31 of the socket 29 in the head 16.

The operation of the device is as follows:

When the head 16 is about to be assembled with the arm 14, the adjustable part 33 is screwed into the tubular part 34 as far as possible. The end of the tubular part 34 carrying the adjustable part 33 is pushed into the socket 29 of the head 16 as far as possible; that is, until the steel ball 38 bears against the thrust disk 40. The other end of said arm 14 is rotatably connected to the head 15. The band 13 is now placed over the pulleys carried in the heads 15 and 16 at either end of the arm 14. The pin 37 is introduced into one of the recesses 35 through the opening 36 in the wall of the socket 29 of the head 16. The tubular part 34 is then rotated, the adjustable part 33 being prevented from rotating by the pin 37, the direction of this rotation being such as to screw the tubular part 34 away from the adjustable part 33. This action thrusts the tubular part 34 outward from the head 16 and thereby tends to tighten the band 13 by increasing the distance between the pulleys carried in the heads 15 and 16. When the band 13 is sufficiently tight, the pin 37 is withdrawn from the opening 36 so that the adjustable part 33 is free to rotate with the tubular part 34.

If now the tubular part 34 is rotated, the adjustable part 33 will rotate with it, since the friction between the tubular part 34 and the adjustable part 33 is greater than the friction between the steel ball 38 and the thrust disk 40. It is clear that the head 16 can swivel on the end of the arm 14, the ball 38 and the disk 40 being the thrust bearings, without changing the position of the tubular part 34 and the adjustable part 33 relative to each other, and therefore without loosening the band 13 engaging the pulleys at either end of the arm 14.

A similar means may be provided to tighten the band 20 around the pulleys carried by the heads 18 and 21. In the drawings, however, I have illustrated a modification of my invention, as shown in Figure 4. The arm 19 comprises four parts. The tubular part 41 is firmly fixed into one end of the grip 42. An adjustable part 43 is screwed into the other end of the grip 42. The other end of the adjustable part 43 is received by the socket 29 of the head 18. Into this end of the adjustable piece 43 is fitted a plug 44 to rotate therewith. The plug 44 is provided with one or more recesses, two of said recesses being shown at 45. A pin 46 is adapted to pass through a hole 47 in the head 18 and engage one of the recesses 45. A hardened steel ball 48 rests in a socket in the end of the plug 44 and bears against a thrust disk 49 at the inner end of the socket. The operation of this modification will be apparent from the foregoing description of the operation of the preferred form and will therefore not be repeated herein.

Although I prefer to position the adjustable parts of the arms in sockets in the elbow heads 16 and 18, they may be positioned in sockets in the heads 15 and 21.

From the foregoing description taken in connection with the accompanying drawings the uses, advantages, and operation of the band-tightening device of my invention will be readily understood by those skilled in the art to which the invention appertains. While I have described the principle of operation, together with the forms of my invention which I now consider to be the best embodiments thereof, I desire to have it understood that the forms shown are merely illustrative and that the invention is not to be limited to the details disclosed herein, but is to be accorded the full scope of the appended claims.

I claim:

1. In a drafting machine of the band and pulley type, an arm comprising a tubular part and an adjustable part, a head at one end of said arm, said head having a socket which is adapted to receive the adjustable end of said arm, a second head carried at the other end of said arm, a pulley rotatably mounted on the first-mentioned head, a second pulley rotatably mounted on the second-mentioned head, a flexible band extending around said two pulleys, the adjustable part of said arm threadedly engaging the end of said tubular part within the socket of the first-mentioned head, said adjustable part having a recess on its periphery outside of said tubular part, a thrust bearing between said adjustable part and the socket containing it, and an opening through the wall of said socket which is adapted to admit a pin to said recess in said adjustable part for preventing the rotation of said adjustable part of said arm with respect to said tubular part of said arm.

2. In a drafting machine of the band and pulley type, an arm comprising a tubular member internally threaded at one end and an adjustable part externally threaded at one end, and in threaded engagement with said tubular member, said adjustable part having a recess on its periphery, a head having a socket adapted to admit said adjustable part, there being a substantial clearance between said adjustable part and the walls of said socket, a thrust bearing acting between said adjustable part and the end wall of said socket whereby said arm is adapted to be rotated without affecting the length of said arm, and an opening in the wall of said socket which is adapted to admit a pin to said recess in said adjustable part whereby the length of said arm may be changed by rotating the adjustable part with respect to said internally threaded tubular member.

3. In a drafting machine of the band and pulley type, an arm comprising a tubular member internally threaded at one end and an adjustable part externally threaded at one end and

in threaded engagement with said tubular member, said adjustable part having a recess on its periphery, a head having a socket adapted to admit said adjustable part, a thrust bearing acting between said adjustable part and the end wall of said socket, and an opening in the wall of said socket which is adapted to admit a pin to said recess in said adjustable part.

4. In a drafting machine of the band and pulley type, an arm comprising two elongated members threadedly engaged longitudinally, an end portion of one of said members extending longitudinally beyond the other of said members, said extending end portion being provided with a recess on its periphery, a head having a socket which is adapted to admit said recessed portion of said elongated member, a thrust bearing acting between said elongated member and the end of said socket, and an opening through the wall of said socket, said opening being adapted to admit a pin to said recess in said elongated member.

5. In a drafting machine of the band and pulley type, the combination of an arm comprising a first elongated member and a second elongated member, said elongated members being threadedly engaged longitudinally and one end of said first elongated member being extended longitudinally beyond said second elongated member, a head having a socket adapted to admit an end portion of said first elongated member, a thrust bearing acting between said first elongated member and said head, whereby said arm can be rotated without affecting the length of said arm, a recess on the periphery of the portion of said first elongated member in said socket, and an opening in the wall of said socket which is adapted to admit a pin to said recess in said first elongated member whereby the length of said arm can be changed by the rotation of said second elongated member with respect to said first elongated member.

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