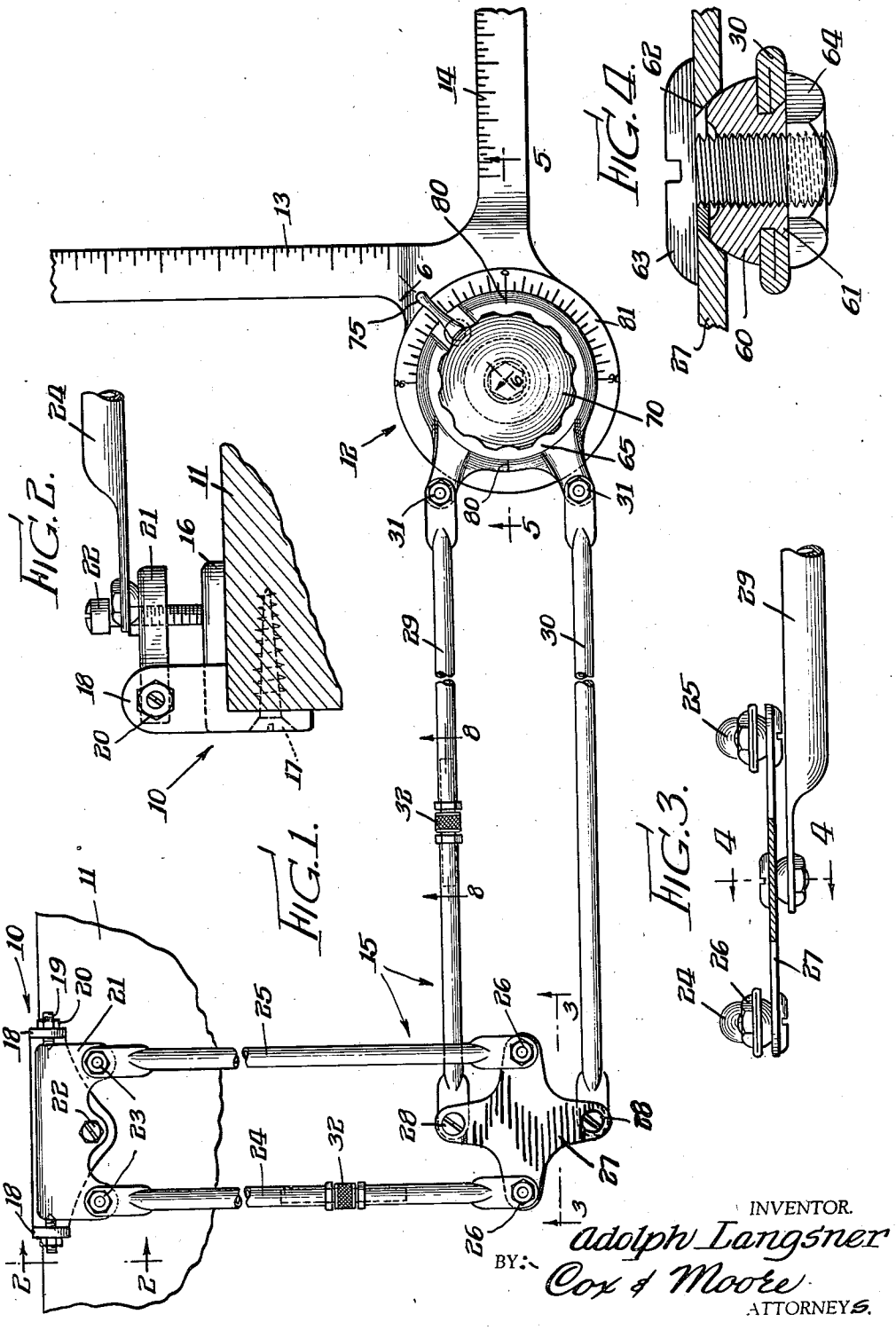
Nov. 8, 1938. A. LANGSNER 2,136,140

DRAFTING APPARATUS

Filed July 25, 1938 2 Sheets-Sheet 1



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DRAFTING APPARATUS

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FIG. 5.

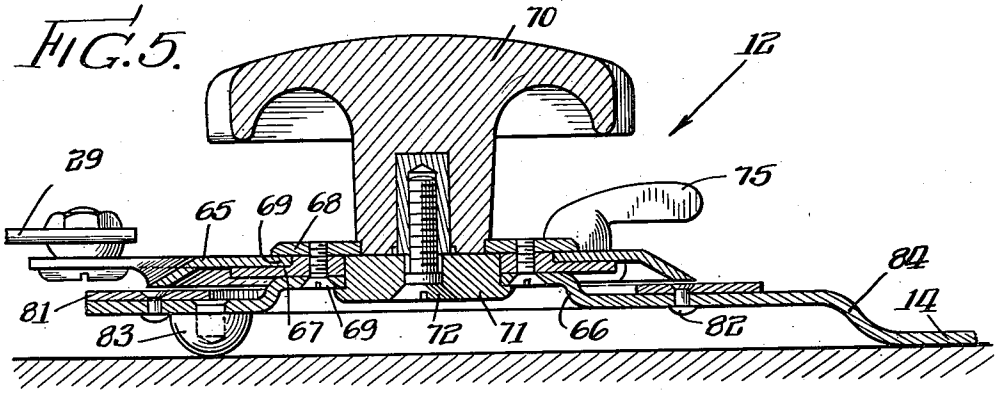


FIG. 6.

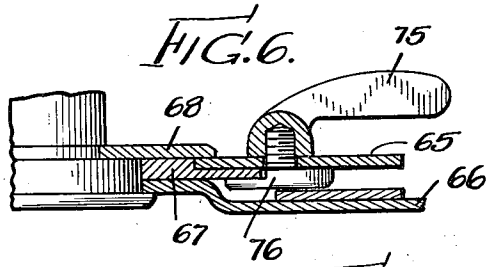


FIG. 7.

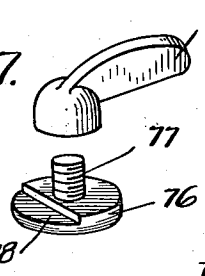


FIG. 8.

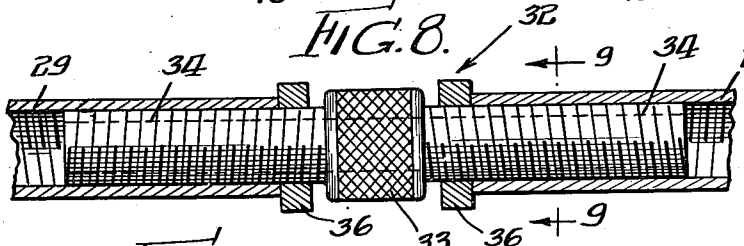


FIG. 9.

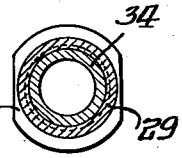


FIG. 10.

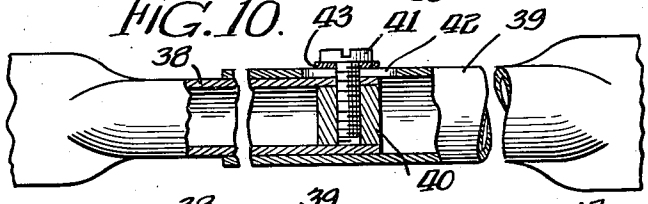


FIG. 11.

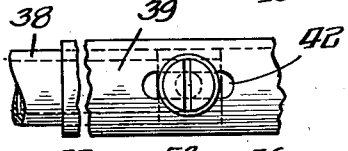


FIG. 12.

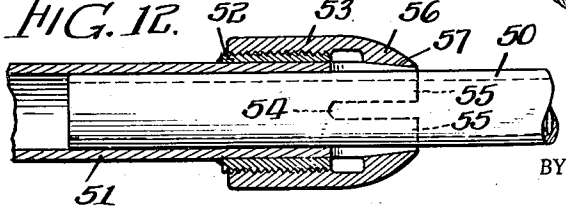


FIG. 13.

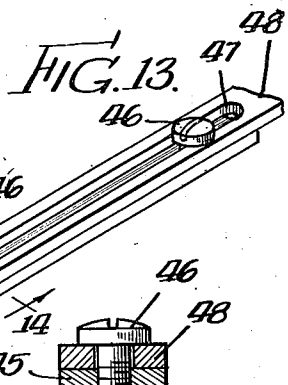


FIG. 14.

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2,136,140

DRAFTING APPARATUS

Adolph Langsner, Chicago, Ill., assignor to Eugene Dietzgen Co., Chicago, Ill., a corporation of Delaware

Application July 25, 1938, Serial No. 221,071

8 Claims. (Cl. 33—79)

This invention relates to drafting apparatus, and more particularly to parallel line drafting or ruling apparatus adapted for use on drawing boards or tables.

It is an object of the invention to provide a parallel line ruling or drafting device for use on drafting boards or the like of improved construction and operation, of increased strength and rigidity, and of maintained accuracy.

More specifically it is an object of the invention to provide a parallel line drafting or ruling device of the type having an operating mechanism composed of parallel extending arms or bars, wherein the arms are made of tubular form for increased strength and rigidity and wherein means is provided for adjusting the length of the arms to insure and maintain the parallel and accurate operating relationship between the parts. In accordance with the invention this adjusting means may be of the micrometer or screw thread type to facilitate accuracy of adjustment.

It is a further object of the invention to provide in parallel line or ruling apparatus of the type stated an improved bearing or pivot connection for the arms which can be readily adjusted to compensate for wear whereby to maintain accuracy in the apparatus over long periods of use.

A still further object of the invention is to provide in parallel line apparatus a ruling head assembly of improved and simplified construction which can be readily fabricated and assembled readily adjusted to and securely locked in any desired position of angular adjustment, and which forms a smooth sliding head construction for facilitating ease of movement of the apparatus over the surface of the drawing board.

Still other objects and advantages of the invention will appear from the following description when taken in connection with the accompanying drawings wherein certain preferred embodiments of the invention are set forth for purposes of illustration.

In the drawings, wherein like reference numerals refer to like parts throughout:

Fig. 1 is an assembly view of a parallel line apparatus constructed in accordance with the principles of the invention.

Fig. 2 is a detail view, taken along the line 2—2 of Fig. 1, of the bracket by means of which the apparatus may be secured to a drawing board or the like.

Fig. 3 is a detail view of the plate member and associated parts for securing the sets of arms of the operating mechanism together, being taken along the line 3—3 of Fig. 1.

Fig. 4 is a sectional detail of the pivot connection for securing the arms to the plate member, taken along the line 4—4 of Fig. 3.

Fig. 5 is a sectional view through the head construction on the line 5—5 of Fig. 1.

Figs. 6 and 7 are detail views of the clamp member for holding the head in adjusted position, Fig. 6 being taken on the line 6—6 of Fig. 1.

Figs. 8 and 9 are detail views of one preferred form of adjustment means for adjusting the length of the arms, Fig. 8 being taken along the line 8—8 of Fig. 1, and Fig. 9 being a transverse section along the line 9—9 of Fig. 8.

Figs. 10 and 11 are side, sectional and top views respectively of a second preferred form of adjustment means.

Fig. 12 shows a third form of adjustment means, and

Figs. 13 and 14 are views illustrating a still further form of adjustment, particularly adapted for use with arms of the flat bar type, Fig. 14 being taken on the line 14—14 of Fig. 13.

Referring now to the drawings, and first to the embodiment of the invention illustrated in Figs. 1 to 9 inclusive, it will be seen that the parallel line or ruling apparatus illustrated comprises in general a bracket or holder 10 by which the apparatus may be secured to a drawing board or the like 11, a head construction indicated generally by the reference numeral 12 carrying the line ruling elements 13 and 14, and an operating mechanism or guiding means 15 operatively connecting the bracket and head.

More specifically, see Fig. 2, the securing bracket 10 comprises an angle bracket member 16 adapted to be secured to one edge of the drawing board by suitable means such as screws 17. The bracket member is provided with a pair of upstanding lugs 18 which carry threaded pivot pins 19, the pins being secured in position by lock nuts 20. A plate member 21 is mounted for pivotal movement upon the pivot pins. This plate member carries an adjustable screw 22, the lower end of which is adapted to engage the bracket member 16 when the plate 21 is rotated counterclockwise to the position shown in Fig. 2. By rotating the screw 22, the position at which the plate will be held by the screw may be adjustably predetermined.

The plate 21 also carries a pair of pivot connections 23 to which the parallel extending arms 24 and 25 of the operating mechanism are secured at one of their ends. The opposite ends of the arms are secured by similar pivot connections 26 to a four-armed plate member 27. This plate

member is in turn secured by pivot connections 28 with a second set of parallel extending arms 29 and 30 which are adapted to be secured to the head 12 by the pivot connections 31. It will be seen that by means of the operating mechanism, the head 12 may be readily moved to any desired position upon the face of the drawing board, and during such movements will always be maintained in the same angular position to which it may have been adjusted so that all lines drawn or devices, such as triangles or the like, positioned by the ruling elements 13 and 14 will be maintained in parallel relation. During the movements of the head the arms of the operating mechanism act as double parallelograms and constantly maintain the parallel positioning and relation of the parts.

As will be best seen by reference to Figs. 1, 2, 3, 8 and 9, the arms are in the form of elongated metal tubes flattened at their ends to receive the pivot connections. This tubular construction of the arms provides maximum strength and rigidity in the apparatus with a minimum of weight. Each of the arms 24 and 29 is provided with an adjustment means 32 specifically illustrated in Figs. 8 and 9, for adjusting the arm length. The adjusting mechanism here illustrated comprises a manually operable knurled knob 33 fixed upon a rotatable cylindrical member 34, threadedly received within the ends of the tubular arms. One of the ends of the member 34 is provided with right-hand threads whereas the other end is provided with left-hand threads, so that as the member is rotated by the knurled knob in one direction or the other, the parts of the tubular arm in threaded engagement with the member will be drawn toward each other or separated depending upon the direction of rotation. Lock nuts 36 are provided for locking the member 34 in any desired position of adjustment. By means of the adjustment mechanism thus provided, micrometer adjustments may be imparted to accurately control or adjust the length of the arms 24 and 29. In manufacturing and assembly of the parts, slight inaccuracies or discrepancies may result, so that if no adjustment means were provided, the arms might not be of equal effective length and arranged in true parallel relation. The adjusting mechanism not only provides a means for initially adjusting the arms to insure true positioning, but also provides a ready means for compensating for inaccuracies which may result from wear. Obviously adjusting means may also be provided in the arms 25 and 30, if desired. Ordinarily, however, an adjustment mechanism in one of each pair of arms will suffice to insure equal arm length and accurate positioning of the parts.

In Figs. 10 and 11 an alternate form of adjusting means is illustrated. In this instance the tubular arm is so constructed that one part 38 thereof is smaller than the other part 39, the two parts being arranged in telescoping relation. The end of the inner or smaller tubular member 38 is provided with a block 40 which threadedly carries an adjusting screw 41. This adjusting screw projects through a longitudinal slot 42 provided in the outer tubular member 39, a washer member 43 being provided, if desired. When the screw 41 is loosened the two telescoping arm parts 38 and 39 may be arranged in the desired adjusted position, the screw 41 sliding within the slot 42 during adjustment. When the screw member 41 is tightened, the parts will be held in adjusted position.

In Figs. 13 and 14 a generally similar form of adjusting means to that just described is illustrated adapted for use in a construction wherein the arms are of the flat bar type. In this instance one arm part 45 carries a pair of screws 46 adapted to slide within a slot 47 provided in the other arm part 48. When the screws are loosened, the arm parts may be adjusted to any desired position, and upon tightening of the screws will be firmly held against unauthorized movement.

In Fig. 12 a still further form of adjusting means is illustrated. In this form of construction the smaller tubular arm part 50 is telescopically received within the larger tubular part 51. A threaded sleeve 52 is fixed to the end of the part 51 and has threaded connection with a cylindrical chuck member 53. The extreme end of the tube 51 is provided with a plurality of longitudinally extending slots 54 whereby to provide a plurality of extensions 55, which extensions are adapted to be embraced by the gripping portion 56 of the chuck member. Preferably this gripping portion and the tube extensions are provided with cooperating tapered surfaces as indicated at 57. When the chuck member is rotated so as to be threadedly moved to the right, as seen in Fig. 12, the tubular parts 50 and 51 of the arm will be released for relative longitudinal adjusting movement. After adjustment the chuck is rotated so as to be moved to the left. This causes the gripping portion 56 of the chuck to firmly embrace the extensions 55 of tube 51 which are in turn moved into tight gripping engagement with tube 50 whereby to hold the parts in adjusted position.

The pivotal connections 23, 26, 28 and 31 are all preferably of similar construction, and are illustrated in detail in Fig. 4. As here shown, the pivotal connection comprises a spherically-shaped member 60 of hard metal suitably secured to the end of the arm 30. Preferably the member 60 is riveted to the arm as indicated at 61 whereby to form a tight and permanent connection between the parts. The outer spherical surface of member 60 cooperates with a conical opening 62 provided in the plate member 27. A bolt or screw 63 has its head portion engaged against the upper surface of the plate 27 and its shank threadedly received within the spherical member 60. A lock nut 64 is provided for locking the bolt in position. In the operation of this pivot connection parts 60, 63 and 64 move as a unit with the arm 30, members 60 and 63 having sliding bearing engagement with the plate 27. Over long periods of service wear may occur resulting in looseness in the bearing surfaces. This looseness, however, may be readily removed by loosening the lock nut 64, and tightening bolt 63 after which the lock nut 64 is again drawn up to hold the parts in adjusted position. The spherical surface of the member 60 and the cooperating conical surface 62 of the plate 27 maintain proper bearing contact in all positions of adjustment. By reason of this readily operable and efficient adjustment mechanism, the pivotal connections may be kept permanently tight. Looseness which would otherwise result in inaccuracy in the apparatus may be readily eliminated.

The head construction is best shown in Figs. 1, 5, 6 and 7. The head comprises a non-rotatable main base plate member 65 secured to the arms 29 and 30 by means of the pivotal connections 31 previously described. The ruling elements 13 and 14 are adapted to be angularly ad-

justed with respect to the plate member, and to be locked in any position of adjustment. To this end the ruling elements are provided as extensions of a rotatable drafting plate 66. This latter plate carries a pair of washers 67 and 68, by means of screws 69. The non-rotatable plate member 65 is provided with an opening for the reception of washer 67, the annular edge 69 of the plate being received between the washers 67 and 68 for bearing engagement therewith. A knob construction consisting of upper and lower parts 70 and 71 held together by a central screw 72 is anchored to the plate 66 and to the washers 67 and 68 for rotatable movement therewith. To hold the plate 66 and the ruling elements 13 and 14 in any desired angular position to which they may be adjusted by knob 70, plate 65 carries a locking device consisting of a handle member 75 and a locking disk 76. The disk 76 has a shank 77 which projects through an opening in base plate 65 into threaded engagement with the handle member 75. The disk is cut away as indicated at 78 for the reception of the outer peripheral edge of washer 67. When the handle member 75 is rotated to locking position, the locking disk 76 is drawn upwardly to clamp washer 67 tightly against plate 65. Plate 66 secured to washer 67 is thus locked in adjusted position. When the handle member 75 is rotated to release position, the locking disk 76 is lowered slightly releasing washer 67 so that plate 66 may be adjusted by means of knob 70. As shown in Fig. 1, the base plate 65 carries a pair of gauge lines 80 which cooperate with a Vernier scale 81 secured to plate 66 by suitable means such as rivets 82. Plate 66 also carries a foot member 83 to facilitate smooth movement of the head construction over the face of the drawing board, the line ruling elements being bent downwardly as indicated at 84 to compensate for the height of the foot member. If desired, a similar foot member (not illustrated) may be provided on the plate member 27.

It is obvious that various changes may be made in the specific embodiments set forth for purposes of illustration without departing from the spirit of the invention. The invention is accordingly not to be limited to the specific embodiments shown and described, but only as indicated in the following claims.

The invention is hereby claimed as follows:

1. A parallel line drafting apparatus comprising a holder adapted to be mounted upon a drafting board, a drafting head, an operating mechanism connecting the holder and head, said operating mechanism comprising a series of arms arranged in pairs, the arms of each pair being parallel for parallelogram operation, pivot connections for mounting said arms, one of said pivot connections comprising a spherical bearing member mounted in the end of one of said arms, a cooperating bearing member having a conical opening adapted to be slidably engaged by the spherical surface of said spherical bearing member, and an adjustable clamping member adapted to directly engage both of said bearing members and adapted on adjustment to bring the bearing surfaces thereof into proper bearing engagement.

2. A parallel line drafting apparatus comprising a holder adapted to be mounted upon a drafting board, a drafting head, an operating mechanism connecting the holder and head, said operating mechanism comprising a series of arms arranged in pairs, the arms of each pair being parallel for parallelogram operation, pivot connections for mounting said arms, one of said pivot connections comprising a bearing member mounted in the end of one of said arms, a cooperating bearing member having an opening adapted to be slidably engaged by a surface of said first named bearing member, and an adjustment screw adjustably secured to said first named bearing member and having a head portion adapted to engage said cooperating bearing member, whereby upon adjustment of said adjusting screw the bearing surfaces of said bearing members may be brought into proper contacting relation.

3. A parallel line drafting apparatus comprising a holder adapted to be mounted upon a drafting board, a drafting head, an operating mechanism connecting the holder and head, said operating mechanism comprising a series of arms, pivot connections for mounting said arms, one of said pivot connections comprising a bearing member mounted in the end of one of said arms, a cooperating bearing member having an opening adapted to be engaged by a surface of said first named bearing member, and an adjusting screw threadedly secured to said first named bearing member and having a head portion adapted to engage said cooperating bearing member, whereby upon adjustment of said screw the bearing surfaces of said bearing members may be brought into proper contacting relation.

4. A parallel line drafting apparatus comprising a holder adapted to be mounted upon a drafting board, a drafting head, an operating mechanism connecting the holder and head, said operating mechanism comprising a series of arms, pivot connections for mounting said arms, one of said pivot connections comprising a bearing member mounted in the end of one of said arms, a cooperating bearing member having an opening adapted to be engaged by a surface of said first named bearing member, an adjusting screw threadedly secured to said first named bearing member and having a head portion adapted to engage said cooperating bearing member, whereby upon adjustment of said screw the bearing surfaces of said bearing members may be brought into proper contacting relation, and a lock nut also threadedly secured to said screw and adapted on threaded movement to bear against said first named bearing member whereby to lock said adjusting screw in adjusted position.

5. A parallel line drafting apparatus comprising a holder adapted to be mounted upon a drafting board, a drafting head, an operating mechanism connecting the holder and head, said operating mechanism comprising a series of arms arranged in pairs, the arms of each pair being parallel for parallelogram operation, pivot connections for mounting said arms, one of said pivot connections comprising a spherical bearing member mounted in the end of one of said arms, a cooperating bearing member having a conical opening adapted to be engaged by the spherical surface of said spherical bearing member, and an adjustment screw adjustably secured to the spherical bearing member and having a head portion adapted to engage said cooperating bearing member, whereby upon adjustment of said adjusting screw the bearing surfaces of said bearing members may be brought into proper contacting relation.

6. A parallel line drafting apparatus comprising a holder adapted to be mounted upon a drafting board, a drafting head, an operating mecha-

nism for connecting the holder and head, said head comprising a base plate adapted to be secured to the operating mechanism, a drafting plate rotatably adjustable with respect thereto, and means for rotatably mounting said drafting plate upon the base plate, said mounting means comprising a pair of bearing plates secured to the drafting plate and adapted to have bearing engagement with the base plate, one of said bearing plates being adapted to have bearing engagement with one face of the base plate, and the other of said bearing plates having a flange adapted for bearing engagement on the other face of the base plate and a thickened body portion adapted to extend through an opening in the base plate in contact with the edge of said opening into engagement with the first bearing plate, and means for clamping said bearing plates together.

7. A parallel line drafting apparatus comprising a holder adapted to be mounted upon a drafting board, a drafting head, an operating mechanism for connecting the holder and head, said head comprising a base plate adapted to be secured to the operating mechanism, a drafting plate rotatably adjustable with respect thereto, and means for rotatably mounting said drafting plate upon the base plate, said mounting means comprising a pair of bearing plates secured to the drafting plate and adapted to have bearing engagement with the base plate, one of said bearing plates being adapted to have bearing engagement with one face of the base plate, and the other of said bearing plates having a flange adapted for bearing engagement on the other face of the base plate and a thickened body portion adapted to extend through an opening in the base plate in contact with the edge of said opening into engagement with the first bearing plate, a foot member secured to the drafting plate, and integral line ruling extensions formed on the drafting plate, said extensions being bent downwardly into the plane of the supporting portion of the foot member.

8. A parallel line drafting apparatus comprising a holder adapted to be mounted upon a drafting board, a drafting head, an operating mechanism for connecting the holder and head, said head comprising a base plate adapted to be secured to the operating mechanism, a drafting plate rotatably adjustable with respect thereto, and means for rotatably mounting said drafting plate upon the base plate, said mounting means comprising a pair of bearing plates secured to the drafting plate and adapted to have bearing engagement with the base plate, one of said bearing plates being adapted to have bearing engagement with one face of the base plate, the other of said bearing plates having a flange adapted for bearing engagement on the other face of the base plate and a thickened body portion adapted to extend through an opening in the base plate in contact with the edge of said opening into engagement with the first bearing plate, and a locking device mounted upon the base plate and adapted to be brought into clamping engagement with one of said bearing plates.

ADOLPH LANGSNER.